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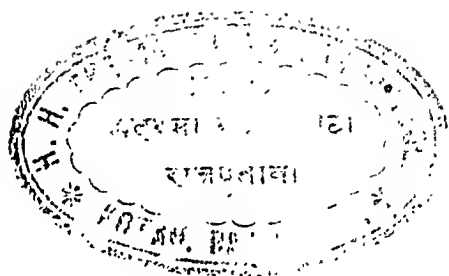
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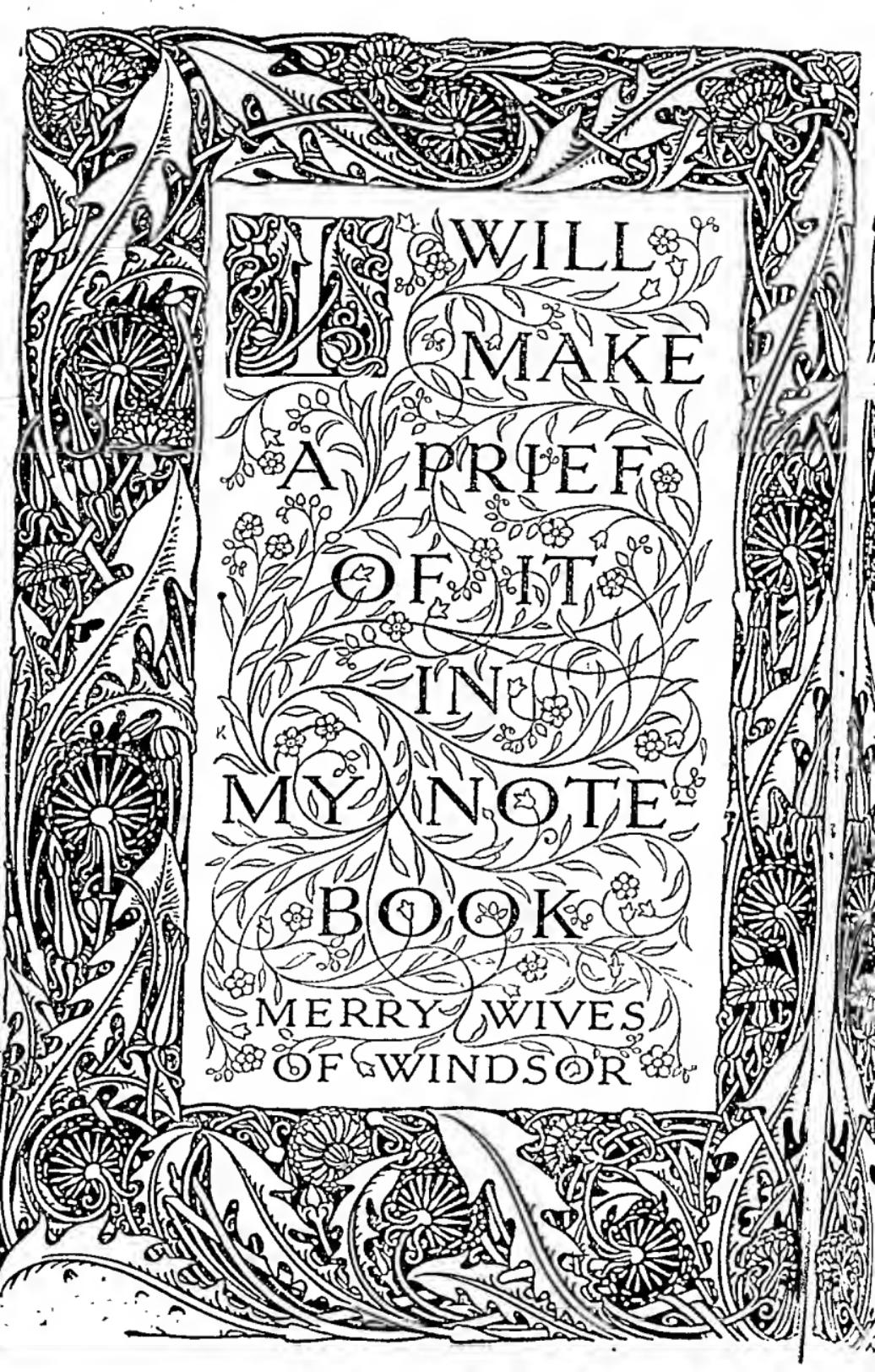
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I WILL
MAKE
A BRIEF
OF IT
IN
MY NOTE-
BOOK
MERRY WIVES
OF WINDSOR

THE   
EVERYMAN
ENCYCLOPÆDIA
 EDITED BY
ANDREW BOYLE
VOLUME, 12
STE-ZYM



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LIST OF ABBREVIATIONS

ac., acres.	i.e., that is.
A.D., after Christ.	in., inches.
agric., agricultural.	inhab., inhabitants.
ambas., ambassador.	Is., island, -s.
ann., annual.	It., Italian.
arron., arrondissement.	Jour., journal.
A.-S., Anglo-Saxon.	Lat., Latin.
A.V., Authorised Version.	lat., latitude.
b., born.	l. b., left bank.
B.C., before Christ.	long., longitude.
Biog. Dict., Biographical Dictionary.	m., miles.
bor., borough.	manuf., manufacture.
bp., birthplace.	mrkt. tn., market-town.
C., Centigrade.	Mt., mts., mount, mountain, -s.
c. (<i>circa</i>), about.	N., north; northern.
cap., capital.	N.T., New Testament.
cf., compare.	O.T., Old Testament.
co., county.	par., parish.
com., commune.	parl., parliamentary.
cub. ft., cubic feet.	pop., population.
d., died.	prin., principal.
Dan., Danish.	prov., province.
dept., department.	pub., published.
dist., district.	q.v., which see.
div., division.	R., riv., river.
E., east; eastern.	r. b., right bank.
eccles., ecclesiastical.	Rom., Roman.
ed., edition; edited.	R.V., Revised Version.
e.g., for example.	S., south; southern.
Ency. Brit., Encyclopædia Britannica.	sev., several.
Eng., English.	Sp., Spanish.
estab., established.	sp. gr., specific gravity.
et seq., and the following.	sq. m., square miles.
F., Fahrenheit.	temp., temperature.
fl., flourished.	ter., territory.
fort. tn., fortified town.	tn., town.
Fr., French.	trans., translated.
ft., feet.	trib., tributary.
Ger., German.	U.S.A., United States of America.
Gk., Greek.	vil., village.
gov., government.	vol., volume.
Heb., Hebrew.	W., west; western.
Hist., History.	yds., yards.

76). an American millionaire and philanthropist, born at Lisburn, Ireland; emigrated to New York in 1823 and opened a dry-goods store in 1825. His business grew to very large proportions and was removed to Broadway. He sent provisions to the sufferers in the Irish famine of 1846 and the French sufferers from the Franco-German War, and was noted for his charitable acts.

Stewart, Balfour (1828-87), a physicist, born at Edinburgh. He became director of Kew Observatory (1859-71), was made an F.R.S. in 1862; became secretary to the Government Meteorological Committee in 1867; professor of Natural Philosophy at Owen's College, Manchester (1870). He made researches into radiant heat, sun-spots, and periodic irregularities in terrestrial and solar phenomena. He wrote *The Unseen Universe*.

Stewart, David, see ROTHESAY, DAVID STEWART, DUKE OF.

Stewart, Sir Donald Martin (1824-1900), a British soldier. He became an ensign in the Bengal Native Infantry (1840), major (1866), general (1881), and field-marshal (1894). He served in the Indian Mutiny (1858), in 1867-68, and in 1880-85).

He was commander-in-chief in India (1880-85), and a member of the Council of India after 1885.

Stewart, Dugald (1753-1828), a Scottish philosopher, was the son of Matthew S., the geometrician. He was appointed in 1785 professor of moral philosophy in Edinburgh University, but though he retained the chair until within eight years of his death, he did not lecture after 1809. He acquired a great reputation by his works, which include: *Elements of the Philosophy of the Human Mind*, 1792-1827; *Outlines of Moral Philosophy*, 1793; and *Lectures on Political Economy*. His works were collected by Sir William Hamilton (1854-60). There is a biography by John Veitch (1858).

Stewart, Sir Herbert (1843-85), a British general. He became ensign in 1863, and deputy - assistant quartermaster - general in Bengal (1872-73). He entered the staff college, and the Inner Temple in 1877, was brigade-major in Natal (1879-80), military secretary to Wolseley (1880), assistant aide-de-camp in Egypt (1882), and served in the Suakin campaign, the Gordon Relief Expedition, and at Abu Klea, where he was mortally wounded, being made major-general before his death.

Stewart, James (1831-1905), an African missionary and explorer, born at Edinburgh; educated there and at St. Andrews. In 1857 he came

under the influence of Livingstone, and in 1860 set about the establishment of a mission in Central Africa. He went to Africa in 1861, spent some time with and after interior, ret.

He went back to Africa in 1866; became principal of the Lovedale Missionary Institute (1870), founded the Blythswood Mission Institute at Transkei and Livingstonia (1875), and a new mission in E. Africa (1891).

Stewart, Sir John, see LENNOX.

Stewart, Matthew (1717-85), a Scottish mathematician, educated at Glasgow, and at Edinburgh under the minister of professor of (1747-85),

being assisted by his son Dugald after 1772, and was made an F.R.S. in 1764. The book which made his reputation was *General Theorems* (1746), and his chief work: *Tracts, Physical and Mathematical* (1761), dealing with astronomical geometry.

Stewart, Patrick (1832-65), a British soldier. He became lieutenant in the Bengal Engineers (1854) and brevet-major (1858), and was attached to the headquarters staff at Lucknow (1857-58). He went to Allahabad with Lord Canning (1858), served on the Cholera Commission (1861-62), and became director of the gov. telegraph at Bombay (1863).

Stewart, Robert, see CASTLEREACH.

Stewart, Sir Thomas Grainger (1837-1900), a Scottish physician, educated at Edinburgh, Berlin, Prague, and Vienna; was president of Royal F.R.S.E. of physician in Scotland (1882), and president of the Edinburgh College of Physicians (1889); knighted in 1894.

Stewart Island, or Rakiura, an island off the S. coast of South Is., New Zealand, crossed by 47° S. Area 665 sq. m. The coast is deeply indented and Paterson Inlet and Port Pegasus are good harbours. It is sparsely inhabited by whalers and natives.

Stewarton, a tn. of Ayrshire, Scotland, on R. Annock, 5 m. N.W. of Kilmaronok. Has dye-works and manufs. of hosiery, caps, and carpets. Pop. (1911) 2841.

Stewartry, a name given in Scotland to crown lands governed by a steward, i.e. a deputy appointed by the king, who had considerable civil and criminal jurisdiction. Ss. formerly existed in Perthshire, Argyllshire, Lanarkshire, Gallway, and Wigtown, but the only one now retaining the name is Kirkcubright.

Steyer, Steyr, or Steir, a tn. of Upper Austria, at confluence of rivers Enns and Steyr, 20 m. S.E. of Linz. It is a quaint town with a mediæval castle, and is now an industrial centre, having manufs. of iron, steel, arms, and knives. Pop. 17,442.

Steyn, Martin (b. 1857), the last president of the Orange Free State before the annexation by the British in 1900. He was born in South Africa, was educated in Holland, and studied law at the Inner Temple, to which he was admitted in 1882. He was elected to the presidency of the Orange Free State in 1896. During the Boer War he acted as a general and led the peasant army of the Free State. He was a member of the Peace Conference of Klerksdorp, but did not sign the surrender at Pretoria.

Steyning, a tn. of Lewes div. of Sussex, England, 12½ m. S. of Hove and 5 m. from the coast. It was formerly a seaport, the ancient Portus Cathmanni. It contains a grammar-school, founded in 1614, and has cattle fairs. Pop. (1911) 1800.

Sticklebacks, or the members of the family *Gastrolepis*, are spiny-rayed Lemnibranch fishes of the sub-order Catostomii. They are small, and have elongated, compressed slender bodies, always without scales, but often protected by means of bony scutes. The anterior dorsal fin is represented by isolated spines, and the ventral fin is formed of a strong spine and one or two soft rays. The S. are noted for their nest-building habit, the males constructing them of leaves, twigs, and grass, and binding them together by a mucus which they secrete. They subsequently guard their young with great care. Nearly all the species are found in fresh water in Europe, Asia, and America, are very pugnacious, and feed on spawn of other fishes. *Gastrolepis aculeatus*, and *G. pungitius* can live in either fresh or salt water; *G. spinachia* (or *S. vulgaris*) is entirely marine. The flute-mouths or pipe-fishes which form the family *Pisculariidæ* have been described as 'gigantic marine sticklebacks' and closely resemble species of *Gastrolepis*.

Steglitz, Christian Ludwig (1756-1836), a German writer on art subjects, born at Leipzig. His works include: *History of Architecture from the Earliest Antiquity to Modern Times*, 1827; *Archæology of the Architecture of the Greeks and Romans*; and *On the Pigments used by Ancient Artists*. He also composed some popular war songs.

Stefler, Adolf (1775-1836), a German cartographer, born at Gotha, where he was afterwards employed in

the government service (1797-1836). His chief work was *Der Handatlas*, 1817-23 (75 plates) (new ed. 1904). He also published *Schulatlas*, 1821; and *Kleines Atlas der Deutschen Staaten*, 1876.

Stier, Rudolf Ewald (1800-62), a German theologian, born at Frauendorf, Posen. In 1850 he was appointed superintendent at Schkeuditz, and in 1859 at Eisleben. Among his works are: *The Words of the Lord Jesus*, 1843 (Eng. trans. 1855-58); *Words of a Risen Saviour* (trans. 1859); *Words of the Angels*, 1862; and *Words of the Apostles*. See *Life* by his sons (1868).

Stifel (or Stifelius), Michael (1486-1567), a became monastic by Luther, and in 1520 left the monastery and went to study at Wittemberg. He lost his first pastorate at Loebau by foretelling the immediate end of the world in *Rechenbeichlein vom end Christi*, 1542. He became professor at Jena and wrote *Arithmetica Integræ*.

Stiff-neck, a rheumatic affection of the muscles of one side of the neck, causing the head to be drawn to one side. S., as the term is ordinarily applied, is usually brought on by exposure to cold or wet, and especially affects individuals with a rheumatic diathesis. Movement gives rise to pain, and occasionally there may be spasm, causing the head to be immovable for the time being. Hot fomentations and general rheumatic treatment are indicated. *Torticollis*, or congenital S., is due to a defect of the sterno-mastoid muscle, usually through injury at birth.

Stigand (d. 1072), an English prelate. He was made Bishop of Elmham, 1038, and reinstated after deprivation in 1044. In 1047 he became Bishop of Winchester, and undertook negotiations between Edward the Confessor and Godwin (1051-52). He was uncanonically appointed Archbishop of Canterbury in 1052, and was accordingly excommunicated, but received the pall from Benedict V. in 1058. He submitted to William I., and helped to crown him in 1066. In 1070 he was charged with various ecclesiastical offences by the papal legate, deprived of his sees, and imprisoned. He was buried in St. Swithun's, Winchester.

Stiglmayer, Johann Baptist (1791-1844), a German engraver and sculptor. Born near Munich, studied in Italy (1819), and on returning in 1824 became superintendent of the Munich bronze-foundry. His works include a bust of Lewis, King of Bavaria, after

Thorwaldsen's model; the monument to Schiller at Stuttgart, also after Thorwaldsen, the statues of the Bavarian prince in Munich Palace, after Schwanthales, and the statue of the Elector Maximilian, after Thorwaldsen.

Stigma, in botany, the terminal part of a carpel. When the ovary consists of several united carpels, it is usually possible to detect the number of component carpels by the corresponding number of Ss. In shape they may be round, square, feathery, or petaloid.

Stigmata, the roots of *Lepidodendron* and *Sigillaria*, two genera of fossil trees which are common in coal. They vary in width from 2 ft. to an inch and in length are sometimes as much as 30 ft. That they are true roots is disputed by some authorities, who class them as underground stems and rhizomes, but most are agreed that they are the ancestors of the modern *Selaginellas*.

Stigmatisation (Medieval Latin, *stigmatizare*, from Gk. *στιγμα*, a mark, puncture), the impression on certain individuals of the 'stigmata' or marks which Jesus received in his Passion, generally held to be given miraculously as a mark of signal favour to those specially devoted to meditation on the Passion. St. Paul's words in Gal. vi. 15 cannot be taken as a distinct assertion that he bore the stigmata. The earliest and the most striking instance is therefore that of St. Francis of Assisi, of which full accounts are given in his life. Since that time some hundreds of instances have been collected, especially during the last century. The case of Louise Latcan (1850-83) is particularly noteworthy on account of the discussion it evoked. It may well be that the miracle is connected with powers of suggestion and hypnotism. See Gourbtyre, *Les Stigmatisés*, 1894.

Stikine River, *Stickine*, *Stickin*, *Stickeen*, a river of N. America, rising in Cassiar, British Columbia, and flowing about 500 m. S.W. to its mouth in Alaska. Navigable for 150 miles.

Stilbite, a zeolite consisting of hydrated silicate of aluminum and lime. It is monoclinic, usually in flattened crystals or sheaf-like aggregations, white in colour (sometimes red) and showing a pearly lustre on cleavage faces (hardness 3.5-4; sp. gr. 2.2). Occurs in cavities in igneous rocks of Ireland, Scotland, and Iceland, etc.

Stilicho, the son of a Vandal captain, became one of the most distinguished generals of Theodosius I., on whose death he became the real ruler of the W. under the emperor

Honorius. He was put to death at Ravenna in 408. He was the patron of the poet Claudian, who addressed an historical epic to him, *On the Consulship of Stilicho*.

Still, see DISTILLATION.

Still, John (1543-1608), an English prelate. He was rector of Hadleigh (1571), canon of Westminster (1573), Master of St. John's College, Cambridge (1574), and of Trinity (1577), Bishop of Bath and Wells (1593). The authorship of *Gammer Gurton's Needle* has been ascribed to him.

Stillborn, see OBSTETRICS, FÆTUS, ABORTION, etc.

Stilling, Johann Heinrich, or **Jung Stilling** (1740-1817), a German mystic, born at Cassel, Hesse-Nassau, studied at Göttingen, where he

at Elberfeld, specialising on eye diseases. He was a professor at Kaiserslautern (1778), Marburg (1787), and Heidelberg (1804), later lived in retirement as a leader of the Pietists. His works, including the autobiography, *Lebensgeschichte* (1777-1804), and various mystical books, were published in 12 vols., 1843-44.

Stillingfleet, Benjamin (1702-71), a botanist and writer, grandson of Edward Stillingfleet (q.v.). Educated at Trinity College, Cambridge, and became tutor of William Ashe-Windham. In 1741 he explored the Mer de Glace at Chamounix. He obtained the patronage of Lord Barrington. He proposed English names for grasses and introduced the Linnean system.

Stillingfleet, Edward (1635-99), an English prelate. He became a fellow of St. John's College, Cambridge, 1653, M.A. (1656), D.D. (1668), and was incorporated at Oxford (1677). In 1667 he became prebendary of St. Paul's, London, in 1669 canon of Canterbury, in 1677 archdeacon of London, in 1678 Dean of St. Paul's, and in 1689 Bishop of Worcester. He was a popular preacher, and acted as chaplain to Charles II. His works include *The Irenicum*, *Origines Sacre*, and *Origines*.

Stillman, ... (1901), an American painter and journalist, born at Schenectady, New York; studied art under F. E. Church, and in 1850 went to England, where he met Ruskin and Turner and came under the influence of Rossetti and Millais. In 1852 he went on an unsuccessful mission for Rossetti to dig up the buried Hungarian crown jewels. On returning to America he devoted himself to landscape painting and founded the *Crayon*. He lived for some time at Cambridge, Mass., then went to London, visited Switzerland with Ruskin, lived in France, became U.S.A.

consul at Rome (1861) and at Crete (1865), and settled in Athens in 1868. He acted as *Times* correspondent in Herzegovina (1875), at Athens (1877-83), and at Rome (1886-98).

Stillwater, the cap. of Washington co., Minnesota, U.S.A., on St. Croix R., 16 m. N.E. of St. Paul. It is at the head of navigation on the river, has a large lumber trade and numerous manufactures. Pop. (1910) 10,198.

Stilpo, a Greek philosopher of the Megarian school, who lived about 300 B.C. He followed the practical ethics of the Cynics. See Seneca, *Epistle* ix.

Stilt, a term applied to any species of *Himantopus*, a genus of Charadriidae, which has a very wide distribution. The name is given to these birds by reason of their extremely long legs, which give them a somewhat ludicrous appearance when in flight. *H. candidus* is seen at times in Britain; *H. melas* inhabit New Zealand, and *H. brasiliensis* S. America.

Stilton, a vil. of Huntingdonshire, England, 7 m. S.W. of Peterborough. It gives its name to a cheese made in Leicestershire and originally sold here. Pop. (1911) 550.

Stilts, poles provided with stirrup-like projections for the feet at a certain distance from the ground, and used for walking over rough or marshy places. Stilt-walking has been for long, and still is, a form of amusement. S. are used regularly in Landes, a district of Gascony, and the Marquesas and other Pacific Is., and stilt-races are a favourite feature of festivities in the former locality. They also figure in Italian masquerades.

Stimulants, agents that increase functional activity. They may be general, exciting the body as a whole to greater activity, or may affect particular organs, as cardiac, renal, hepatic, gastric, cerebral, and other S. They are distinguished from tonics by their more immediate and transient action. It often happens that while a small dose of a S. causes greater intensity of vital processes, a larger dose or repeated small doses tend to cause depression. Thus, alcohol is an effective S. in moderate doses, but if its use be continued, the vital processes become much depressed, so that collapse is an important symptom of alcoholic poisoning. The most common S. are alcohol, ether, chloroform, ammonia, tea, coffee, various essential oils, electricity, heat and cold under certain conditions, etc.

Sting Fish, see WEEVER.

Stinging Animals and Plants. Though commonly used as a means of defence both in animals and plants the power of inflicting a wound and

introducing a poisonous fluid is employed by many animals as a means of securing their prey. One of the lowliest stinging animals is the hydra which has a number of cells in the tentacles (see STINGING CELLS). A lobe of the spittle gland in gnats is modified for the secretion of poison. Bees, wasps, ichneumon and saw flies inflict their stings by means of modified ovipositors. The poison glands of spiders are in appendages near the mouth. A number of fishes, notably the sting rays and the weevers, have also stinging powers. Stinging plants (e.g. nettle) are usually furnished with sharp stiff hairs which secrete an acrid fluid. Some are capable of causing serious results.

Stinging Cells, or Cnidoblasts, occur in Coelenterates as bulb-shaped structures containing fluid and having the narrower end prolonged into a fine tube folded inwards in the cavity of the bulb as a spiral coil. Externally the cell bears a conical projection (cnidocil), and when a small animal comes in contact with this the fine tube turns inside out and is shot into the animal's body, becoming fixed by barbs at the base of the tube while poison passes through it.

Sting-rays, or Whip-tailed rays, are the fishes which constitute the family Trygonidae in the sub-order Raji. There are about fifty species of these elasmobranchs, occurring in most tropical and subtropical seas, and they are characterised by their long, slender, whip-like tails.

Stinkstone, or Swinestone, is a limestone which gives off a foetid smell (sulphuretted hydrogen gas) when struck with a hammer.

Stinkwood, a term applied to the wood of numerous plants, is used especially in reference to *Gustavia augusta*, a species of Lecythidaceæ. The wood has a foetid smell, and the tree occurs in tropical America.

Stint, the name given to several species of sandpiper in the genus *Tringa* of the family Charadriidae, and all are related to the dunlin. *T. minuta*, the little S., is a small bird often seen in Britain.

Stipa Pennata, see FEATHER GRASS.

Stipend, originally the pay of soldiers; but now means the annual allowance or income of an ecclesiastical benefice, though in a wider sense it denotes any settled pay for services whether daily, monthly, or annual. In Scotland the term applied specifically to the provision made for the support of the parochial ministers of the old Established Church, consisting of payments made in money or (formerly) grain, or both, varying in amount according to the extent of the parish and the state of the free

telnds (see TEINDS), or of any other fund specially set apart for the purpose. All Ss. which come short of £150 per annum are made up to that sum from Government funds. In the Roman Catholic church S. also denotes the fee which a priest is entitled to demand for saying mass. 'Stipendiary' in a wide sense means one who performs services for a settled compensation, but has come specifically to denote a paid police magistrate acting in the metropolis or large provincial towns. See POLICE.

Stipules, in botany, are outgrowths often seen at the base of a leaf, as in the rose or pea. They are frequently large and leaf-like, when they perform the assimilative functions of a leaf, at other times they are brownish in colour, and protect the young leaves when in the bud, and in the Robinia they are modified to form protective thorns.

Stirbey, or Stirboi, Barbo Demetrius, better known as Prince Bibescu (1801-69), a statesman, was a native of Roumania. He held the offices of Minister of the Interior, and from 1849-56 was hospodar of Wallachia.

Stirling, a royal and parl. burgh, river port, and the cap. of Stirlingshire, Scotland, 31 m. W.N.W. of Edinburgh, on the Forth. The historic connections of the town are many, its castle having been the scene of several attacks and also the birthplace and residence of several Scottish kings. The field of Bannockburn, which can be seen from the castle walls, is also famous for its battle in 1314. The chief manufs. are leather, tartans, carpets, and woollen goods. Pop. (1911) 21,200.

Stirling, James Hutchison (1820-1909), a Scottish philosopher and writer, was a native of Glasgow, and was educated at the university there, and at first practised as a doctor. He is the author of: *The Secret of Hegel*, 1865; *Textbook to Kant*, 1881; *Sir William Hamilton: being the Philosophy of Perception*, 1865; *As Regards Protoplasm*; *Reply to Huxley*, 1872; *What is Thought?* 1900; *The Categories*, 1903. See *Life* by his daughter, Amelia H. Stirling, 1911.

Stirling, Mrs. Mary Anne (1815-95), an English actress; began her career on the London stage, some of her most successful parts being those of Peg Woffington, Mrs. Malaprop, and the nurse in *Romeo and Juliet*. In 1833 she married Edward S., and afterwards Sir Charles Gregory (1894). She left the stage in 1870.

Stirling, William Alexander (1567-1640), a Scottish poet, born at Menstrie, and obtained part of his education on the Continent. In 1614 he became Master of Requests, and

in 1626 Secretary of State for Scotland. He was made Earl of Stirling in 1633. He was the friend of Drummond of Hawthornden, and belonged to the same school of poetry. He has written: *Darius*, 1603; *Cræsus*, 1604; *The Alexandrian Tragedy*, 1605, and *Julius Cæsar*, 1607, known collectively as the *Monarchicke Tragedies*; *Aurora*, 1604; *A Parænesis to the Prince*, 1604; *Doomesday*, 1614.

Stirling-Maxwell, Sir William, see MAXWELL.

Stirlingshire, a S.-central co. of Scotland, situated between the Firths of Forth and Clyde, is bounded N. by Perthshire, S. by Lanarkshire and Dumbartonshire, E. by the Firth of Forth and Linlithgowshire, and W. by Dumbartonshire. Area 451 sq. m. Pop. (1911) 161,003. S. is one of the most picturesque counties of Scotland, and may be described as mountainous, lying as it does on both sides of the boundary line between the highlands and lowlands, although there are two large plains in it known as the carses of Falkirk and Stirling. The Lennox Hills, known also as the Campsie Fells and Pintry Hills, traverse the co. from W. to E. and reach an altitude of 1500 ft. Ben Lomond, in the N.W. of the co., is 1391 ft. high, and stands on the banks of the famous Loch Lomond, of which about one-half belongs to the county. Other lakes are small, but Loch Katrine touches the N. border for two miles. The principal rivers are the Forth, Avon, Teith, Carron, Devon, Allan, and Bannock. S. is wealthy in minerals, having large seams of good quality coal, while ironstone, sandstone, and limestone are found in abundance. There are fine grazing lands on the plains, sustaining a great quantity of sheep and cattle. Agriculture flourishes most near the banks of the Forth, where large crops of oats and beans are raised. There are several manufacturing centres where a great many people are engaged in the woollen and calico printing industries. Iron founding (mainly at the Carron ironworks), brewing, and distilling are also carried on. Stirling is the capital, and Graugemouth, where shipbuilding is engaged in, is the principal port. S. returns one member to the House of Commons. Numerous battles have been fought in this co., viz., Stirling Bridge (1297), Falkirk (1298 and 1746), Bannockburn (1314), and Kilsyth (1645), the latter resulting in the defeat of the Covenanters. James III. of Scotland was assassinated in the village of Milton, within the county. See Nimmo, *History of Stirlingshire*, 1880, and J. W. Small, *Old Stirling*, 1897.

Stitch, a sharp pain in the side. It may be caused by pleurisy, by spasm of the respiratory muscles during violent exercise, or by intercostal neuralgia.

Stitchwort, see **STELLARIA**.

Stiver (Dutch *Stuiver*), the name of two coins formerly used in Holland, but the term is now applied in Great Britain and America to denote coins of small value, such as a cent or a halfpenny.

Stjernhjelm, Georg (1598-1672), a Swedish poet. After travelling in Europe, he received an appointment at Dorpat, and eventually became a friend of Queen Christina, who made him poet laureate. He also occupied the office of judge in Sweden. Among his works are: *Hercules*, 1653 (a didactic poem); *Bröllops-besvärer/hug-kommelse*.

Stjernstolpe, Ionas Magnus (1777-1831), a Swedish writer, born of poor parents. He managed, however, to obtain a good education, and in 1801 became tutor to the sons of a wealthy merchant, M. Beskow. He then devoted a great deal of his time to translations.

Stoat, or **Ermine** (*Mustela erminea*), a carnivorous mammal, native of Britain, with a much elongated body covered with short fur which generally retains its reddish-brown colour in Britain, but in colder latitudes becomes partially or wholly white and much denser, and is then highly valued by furriers. The S. is about 10 in. long, with a black-tipped tail about 5 in. long. It destroys enormous numbers of rats and mice, and this service is probably worth the loss the S. causes by destruction of game.

Stobæus, Joannes, a Greek writer, lived about 500 A.D.; collected fragments from many Greek writings, which have been handed down in two books—originally in one work known as the *Florilegium*. Edition by Wachsmuth and Hense (1884-94).

Stockade, in fortification, a line of stakes, posts, or trunks of trees set upright in the earth to form a defensive barrier, and generally loopholed to allow the defenders to fire.

Stockbridge: 1. A vill. of Hampshire, England, 8 m. W.N.W. of Winchester. It is a fishing resort, and has a racecourse. Pop. (1911) 860. 2. A tn. in Berkshire co., Massachusetts, U.S.A., 17 m. S. of Pittsfield. Ice Glen, Prospect Hill, and Lake Mahkeonao, the latter being in the vicinity of the house where Nathaniel Hawthorne wrote his works, are all places of interest. Pop. (1910) 1933.

Stokerau, a tn. of Lower Austria, on the Danube, 6½ m. N.W. of Korneuburg. It does a large trade in grain. Pop. 11,740.

Stock Exchange. The London S. E., colloquially termed the 'House,' is a private institution situated in Throgmorton Street, London, the business of which exclusively relates to stock and share dealings. The constitution of the S. E. is governed by a Deed of Settlement made in 1886, though the institution itself was founded before the close of the 17th century, and the management consists of an executive body of nine who represent the proprietors and act as landlords and enjoy the power of fixing at discretion the entrance fee and annual subscription payable by members and clerks. The proprietors themselves are the holders of shares in the original institution, the capital of which consists of 20,000 shares, £12 paid up, with unlimited liability. The managers have no power to control the business transacted in the S. E., nor have the shareholders of the institution any rights *quod* shareholders beyond their claim to dividend. The S. E. 'Committee for General Purposes,' comprised of thirty members elected (under Rule I. of the Rules of the Stock Exchange) annually by ballot by the members, is the effective controlling body of the S. E. The committee is elected by the members, and no one can be elected unless he is, and has been, for the last five years a member of the S. E. The committee has wide disciplinary powers, which are a guarantee to the public that so far as the committee is concerned, or can be responsible, the members they deal with will act honestly and fairly. The business of the committee consists officially of 'routine' i.e. the election of members and the fixing of ordinary settling days, and 'special' i.e. the investigation of claims and other matters relating to the interests of the members or of the public. But there are also a number of other important duties devolving on the committee, the chief of which are the fixing special settling days, granting official quotations, and acting as the sole tribunal for the adjudication of disputes concerning stock and share transactions between members, and as an optional court of arbitration in disputes between members and the outside public. The committee may expel or suspend indefinitely any member who violates the rules or regulations of the S. E., or fails to comply with the committee's decisions, or is guilty of disgraceful or dishonourable conduct; but the resolution for expulsion must be carried by a majority of two-thirds in a specially convened meeting consisting of not less than twelve members, and also confirmed by a majority of the

committee at a subsequent meeting. Where legal proceedings between the public and a member are pending it is the practice of the committee not to intervene until the case has been disposed of by the courts. If no legal proceedings are pending the committee may hold a formal investigation, and the non-member is required to sign an agreement to refer the matter to the committee's arbitration and to be bound by its decision. No person can become a member of the S. E. who is not of age (*see INFANT*), and, in addition, an applicant for membership must, prior to the ballot, be recommended by three members of not less than four years' standing, each of whom must bind himself to forfeit £500 to the applicant's creditors should he be declared a defaulter within four years from the date of his admission. The recommenders are asked whether they would take the applicant's obsequy for £3000 in the ordinary course of business, and whether they consider of their own personal knowledge that he can be safely dealt with. After election members must, before exercising any privilege of membership, become a proprietor of the S. E. by obtaining at least three shares (if a nominated member), or at least one share (if eligible for the *waiting list*, which includes only those who have served as clerks in the House or settling rooms for four years, with a minimum service in the House of three years). The members are divided into brokers and jobbers (*see JOBBERS*). A broker's business consists in buying and selling for the public on commission. As a rule a broker will deal in any class of security the client desires if he can find a jobber or dealer ready to buy or sell the required shares. The rate of commission varies with the class of security; though competition has compelled practically all brokers to follow a uniform scale. It is no concern of the jobber whether the broker is acting as a principal or as an agent, for by Rule 54 the S. E. 'does not recognise in its dealings any other parties than its own members; every bargain, therefore, whether for account of the member effecting it, or for account of a principal, must be fulfilled according to the Rules, Regulations, and Usages of the Stock Exchange'; and, as a rule, the jobber has, in fact, no knowledge of the person for whom the broker may be acting. A jobber may make bargains directly with the public, but if so, not in the House itself. As a rule, the jobber restricts his dealings to one class of securities, and takes his stand in that part of the House devoted by custom to dealings in his line of securities,

and known therefore as the 'market' for such securities. It is hardly necessary to say that no member can act in the dual capacity of broker and jobber, though, as at the bar, the member of one profession can change over and become a member of the allied profession, though the change from broker to jobber, or *vice versa*, can be effected far more quickly than from barrister to solicitor, or *vice versa*. Partnerships between brokers and jobbers are forbidden by Rule 43, on the ground that the broker's duties towards his clients might conflict with his own personal interests (Schwabe and Branson, *Law of the Stock Exchange*). A jobber who has made a price is bound by the rules to deal at that price. When the broker names no amount, the jobber's quotation is only binding on him to the limit of £1000 stock, or ten shares if the value be under £500, or a number not exceeding that sum in value. It is the broker's duty to see that all bargains are made at fair prices for his clients, and that share or stock transfers are duly registered for them. Clerks in the S. E. are either 'authorised' or 'unauthorised,' the former may, with the approval of the committee, transact business for a member, the latter may not, and may only attend on a member to check bargains. Authorised clerks must be over twenty years of age, have been clerk to a member for two years, and pay an entrance fee of fifty guineas, together with an annual subscription of thirty guineas. The entrance fee and subscription of an unauthorised clerk, who must be over seventeen years of age, are ten guineas and twelve guineas respectively. Members who find themselves unable to meet their engagements may be, but are not necessarily, expelled.

OFFICIAL QUOTATIONS: *The Tape*.—The *Official List* is made up from the bargains marked. The official 'marking' is made up from the 'tickets' recording the transactions effected between 11 A.M. and 3 P.M. (transactions effected between 3 P.M. and 4 P.M. are called 'closing prices,' those effected after closing hours, 'street prices'). No transaction may be marked unless made in the House between members and at the real market price. No security may be quoted in the *Official List* without the permission of the committee: though such quotation is 'no guarantee that the concern to which the securities relate is sound, but only that the requisite formalities have been complied with; formalities, indeed, with which, in case of fraud, it would be somewhat difficult to comply' (Schwabe and Branson,

Law of the Stock Exchange). Fluctuations in prices are recorded on the 'tape' of the automatic machines of the Exchange Telegraph Company ('tape prices'). Most brokers are subscribers to this company, and have one or more 'tape machines' fitted up in their offices.

DEALING ON THE STOCK EXCHANGE.
—Effecting a bargain with a jobber: A broker after receiving an order from a client must advise the latter of the sale or purchase by sending him a contract note showing the name of the jobber with whom he has effected the deal. By the Stamp Act, 1891, and amending Acts, the duty is 1d. where the transaction concerns a security of the value of £5 and under £100, and 1s. for £100 and over. Default in transmitting a contract note entails on the broker a penalty of £20, and if he sends a note without the proper stamp upon it, he forfeits his commission. Orders to deal in stock are in practice abbreviated, each £1000 nominal value being reckoned as 1, e.g. an order to buy '5 Great Northern,' means £5000 Gt. Northern stock. American railway securities are quoted in shares of 100 dollars each; thus 200 Union Pacs.=£4000 Union Pacific Railroad shares. In the absence of a special agreement, commission charges are according to a customary scale (as to which see *Cordingley's Guide to the Stock Exchange*). By the custom of the S. E. a jobber may not ask the broker whether he is a buyer or a seller, and therefore he always names both his buying and his selling price (the difference between the two being the 'jobber's turn,' or 'turn of the market') when asked by the broker for a quotation; the object of which custom is to ensure the jobber making a proper quotation. A jobber may, but is not likely to, refuse to give a quotation. Quotations are usually made in £ and fractions of a £ rising by $\frac{1}{4}$ or more, e.g. $\frac{1}{4}$ of £=1s. 3d., $\frac{1}{2}$ =11s. 3d., and $\frac{3}{4}$ =18s. 9d. The 'jobber's turn' varies according to the nature of the security and the state of the market; and where a security is being briskly dealt in, the jobber usually satisfies himself with a smaller 'turn' because of the greater facilities for cutting his losses by converse bargains.

Time bargains ('for the account') and investments ('for money').—Buying for a permanent investment speaks for itself; the term 'speculative' in connection with S. E. dealing requires explanation, and is not to be confounded with mere 'gaming.' A 'speculative' deal, or *time bargain*, is where the member (acting, of course, for his client) who sells has not the

securities to deliver, and either does not intend getting them, or intends to get them at a later date at a price lower than that at which he has agreed to sell. Such dealings being for a future date, the buyer can re-sell and the seller rebuy the same number of the same securities at any time before the date of completion; thus he himself merely pays or receives the difference in price between the two bargains. In the colloquial language of the S. E. a 'bull' is a person who buys securities to be paid for in the future in the hope that the price will rise and enable him to sell at a profit before the date of payment; a 'bear' is one who sells for delivery at a future date in the hope that the price will fall, and so enable him to rebuy at a lower price before the date of delivery. Time bargains are perfectly lawful, and, indeed, the great majority of transactions on the S. E. are of that class and not intended as investments.

Option.—Over and above the two ordinary modes of dealing of 'for money' and 'for the account,' there is a widely prevalent mode of dealing called 'option dealing.' Options are either 'puts' or 'calls.' A 'put' is the right to make the buyer giving the option take delivery at a future date of an agreed amount of some security at a fixed price. A 'call' is the right to make the seller deliver at a future date an agreed amount at a fixed price. The combined 'put-and-call' option gives the right either 'to put' or 'call.' This system is advantageous in that the profit may be unlimited, whereas the possible loss is fixed at the amount paid for the option. It differs from 'cover' (q.v.) in that the 'option money,' i.e. amount paid down per share for the option, is never returnable.

Arbitrage (q.v.).—Arbitrage business consists in buying in one exchange and selling in another. When the two deals take place, not between the London and a foreign exchange but between London and a provincial exchange, or between two provincial exchanges, the operation is known as 'shunting.'

Carrying over and settlement.—Usually securities are bought or sold for delivery on the next settling day. Where, however, completion of the bargain is postponed to the next 'settling day,' and so on from account to account, the process is known as 'carrying over.' There is no obligation on either party to carry over in the absence of express agreement to the contrary. All 'carrying over,' or 'continuations,' must be effected at the making-up price or the then exist-

ing market-price (i.e. the price ascertained by the clerk of the House two days before settling day to be the average price between certain hours). Carrying over is effected on the first day of each settlement: this is called 'contango day.' On this day brokers arrange with jobbers to carry over to the next account, and therefore if a client does not wish to close or abandon his transaction, after paying or receiving the difference, he must before 11.15 A.M. on 'contango day' arrange for his broker to carry over. If he fail to do so, the broker can at once close the transaction at market price, and charge or pay his client the difference. The second day of the settlement is called 'ticket day,' or 'name day.' On or before this day a purchaser who intends taking up his securities issues a ticket stating that he is prepared to pay the purchase money. This ticket, which the broker passes on to the broker who sold the particular securities, contains, among other things, the name of the person to whom the purchaser desires the securities to be transferred and the price at which the bargain was effected. With these particulars the selling broker can make out a deed of transfer and deliver the securities. If, however, the party who was the ultimate purchaser's immediate seller does not intend to deliver because he in his turn bought from some one else, the ticket is passed on from hand to hand until it reaches the ultimate seller, who is the proper person to make out the deed of transfer. On the third day of the settlement, called 'settling day,' or 'pay day,' securities are taken up and paid for, or the differ-

appointment of a special settling day, and if the committee do not grant such day, the bargains made cannot be enforced.

GAMING AND WAGERING.—*Prima facie* all time bargains would seem to be mere gaming transactions, and therefore unenforceable. The essential difference is this: that in a gaming 'contract' there is not only no intention on the part of either party to deliver or take delivery, but no obligation upon either to do so. There must be 'an agreement or understanding that all the buyer has to do is to receive from, or pay to, the seller the difference between the price of the bargains and the price at some future

date.' Gaming is therefore practically impossible on the S. E., not because people do not speculate in differences (this is really all most of them ever intend to do), but because the expressed obligations on the parties make it impossible or almost impossible to make a contract which is void under the Gaming Acts. Consult *Schwabe and Branson's Law of the Stock and*

St. family, such as the cod, haddock, hake, ling, and torsk, which are preserved by splitting open and drying without the use of salt.

Stockhausen, Julius (1826-1906), a vocalist, son of Franz S. (harpist and composer) and Madame S. (vocalist); studied at Strasburg (1844) and at Paris (1845-46) under Charles Hallé for piano and Garcia for singing; became director of Stuttgart

of Stera's (1874), and teacher in Frankfurt Conservatorium (1882).

Stockholm, the cap. of Sweden, situated on the channel by which Lake Mälär discharges its waters into the Baltic, from which it is distant 36 m. The city is built partly on the continent and partly on nine islands formed by the said channel. The island of Stockholm, also known as Staden, was the site of the original town. It contains the Royal Palace, an edifice of architectural merit, surrounded by beautiful gardens and adorned with a colossal statue of Gustavus Adolphus, which stands in front of the courtyard, and the cathedral, or church of St. Nicolai, where the kings of S. are crowned. The harbour is large and of great depth, and is capable of accommodating large vessels, but is blocked with ice during the winter. The islands are connected with each other and the mainland by handsome bridges. The chief industries of S. include shipbuilding, engineering, brewing, tanning, and the manufacture of silk, tobacco, cork, and leather. The chief suburbs are

Ostermalm, or being the Swedish navy, with an arsenal and extensive shipyards and depôts. Pop. 341,986.

Stockingford, a vill. of Warwickshire, England, 1 m. W. of Nuneaton; engaged in coal-mining and brick-making. Pop. (1911) 5006.

Stockmar, Christian Frederick, Baron (1787-1863), was educated at the University of Jena, where he devoted himself particularly to the study of medicine. In 1814 he accom-

panied a Saxon regiment as chief physician, and soon afterwards became one of the doctors of the hospital at Worms. S. about this time met Stein, and began to turn his attention towards politics and diplomacy. He became the confidential adviser of Leopold I. of the Belgians. In 1836 he came to England to act as adviser to the young Princess Victoria, who succeeded to the throne in the following year. S. had for a while a good deal of influence at the English court.

Stockport, a municipal and parl. bor. of Cheshire, England, 6 m. S.E. of Manchester. The town itself is built on the edge of a ravine, with precipitous streets. Among its pleasure grounds, of which there are several, is Vernon Park, containing a museum. The chief manufs. include cotton goods, hats, machinery, and iron ware. Pop. (1911) 108,693.

Stocks (fruit). Many varieties of the larger kinds of fruit are found to be more productive when budded or grafted upon the roots of other trees, e.g. the quince stock for pears, the crab apple for standard apples. Similarly, some varieties of roses make stronger growth and live longer when grown on the briar and other stocks.

Stocks, a device for the punishment of certain criminal offenders which consisted of two haulks of timber so padlocked together as to imprison the feet and hands in holes made for the purpose. In Stow's *Survey of London* they were erected in every ward of London for vagabonds and other petty offenders, while set up over the top of the prison in Cornhill, called the cage, was a pair of S. for the punishment of night walkers. See *PILLORY*.

Stocksbridge, a tn. in the W. Riding of Yorkshire, England, 7 m. N.W. of Sheffield. It manufs. steel wire. Pop. (1911) 7090.

Stockton: 1. The cap. of San Joaquin co., California, U.S.A., 70 m. E.N.E. of San Francisco, on the Atchison, Topeka, and Santa Fé Railroad. Its chief industries are the manuf. of agricultural implements, leather, woollen goods, lumber, and iron goods. Pop. (1910) 23,253. 2. A tn. of Gloucester co., New South Wales, 4½ m. N.E. of Newcastle, engaged in shipbuilding. Pop. about 3000.

Stockton, Francis Richard (1834-1902), an American story writer, who established a type of story for children which won him great popularity in his own country. S. was engaged in journalism for a while before he settled down to serious authorship. There is a pleasant vein of mingled fancy and sentiment about his tales. Among the

most popular of these are: *Tales out of School*; *A Jolly Fellowship*; *Rudder Grange*; *The Lady or the Tiger*; *The Ting-a-ling Stories*.

Stockton-on-Tees, a market tn., municipal and parl. bor., and seaport of Durham, England, on the Tees, 5 m. from its mouth, and 18 m. S.S.E. of Durham. It has extensive docks, foundries, breweries, potteries, railway workshops, engineering works, blast furnaces, and glass bottle works. Canvas, ropes, huckaback, diapers, and cheeks are manufactured here. S. returns one member to parliament. Pop. (1911) 52,158.

Stockwell, a dist. situated in the bor. of Lambeth, S. London, and the site of Spurgeon's orphanage.

Stoddard, Richard Henry (1825-1903), an American poet, born at Hingham, Massachusetts. He began life as a blacksmith, but gave up trade for literature. Through the help of Hawthorne, he was employed in the Custom House from 1853-70. His poetical volumes include: *Foot-prints*, 1849; *Songs of Summer*, 1857; *The King's Bell*, 1862; and *Poems*, 1880. He also wrote: *Loves and Heroines of the Poets*, 1861; *Female Poets of America*; *a Life of Alexander von Humboldt*, 1860; and *Recollections, Personal and Literary*, 1903, etc., and did much reviewing for New York papers.

Stoddart, Thomas Tod (1810-80), an angler and writer, was a native of Edinburgh. He eventually, however, moved his place of residence to Kelso. His chief works are: *The Art of Angling*, 1835; *The Angler's Companion to the Rivers and Lochs of Scotland*, 1847, and also some poems.

Stoics, the name for the sect of ancient moralists opposed to the Epicureans in their views of human life. The Stoical system dates from the end of the 4th century B.C.; it was derived from the system of the Cynics, whose founder, Antisthenes, was a disciple of Socrates. The doctrines, the manner of life, and the death of Socrates were the chief foundations of the Stoical philosophy. The founder of the system was Zeno, from Cittium in Cyprus, who derived his first impulse from Crates the Cynic. He opened his school in a building or porch, called the *Stoa Poecile* ('Painted Porch') at Athens, whence the origin of the name of the sect. Zeno had for his disciple Cleanthes, from Assos in the Troad, whose *Hymn to Jupiter* is the only fragment of any length that has come down to us from the early S., and is a remarkable production, setting forth the unity of God, his omnipotence, and his moral government. *Chrysippus*, from Soli in Cilicia,

followed Cleanthes, and, in his writings, defended and modified the Stoical creed. These three represent the first period of the system. The second period (200-50 B.C.) embraces its general promulgation and its introduction to the Romans. Chrysippus was succeeded by Zeno of Sdon, and Diogenes of Babylon; then followed Antipater of Tarsus, who taught Panætius of Rhodes, who, again, taught Posidonius of Apamea, in Syria. It is remarked by Sir A. Grant that almost all the first S. were of Asiatic birth, and the system itself is undeniably more akin to the oriental mind than to the Greek. Posidonius was acquainted with Marius and Pompey, and taught Cicero, but the moral treatise of Cicero, *De Officiis*, is derived from a work of Panætius. The third period of Stoicism is Roman. In this period we have Cato the Younger, who invited to his house the philosopher Athenodorus, and, under the empire, the three S. philosophers whose writings have come down to us—*Seneca*, *Epictetus*, who began life as a slave, and the Emperor *Marcus Aurelius Antoninus*. Stoicism prevailed widely in the Roman world, although not to the exclusion of Epicurean views. The leading Stoical doctrines are given in certain phrases or expressions, as 'Life according to Nature,' the ideal 'Wise Man,' 'Apathy' or equanimity of mind, the power of the 'Will,' the worship of 'Duty,' the constant 'Advance' in virtue, etc. But perspicuity will be best gained by considering the *Moral* system under four heads—the Theology, the Psychology or theory of mind, the theory of the Good or human happiness, and the scheme of Virtue or Duty. (1) Their Theological doctrines comprehended their system of the Universe, and of man's position in it. They held that the Universe is governed by one good and wise God, together with inferior or subordinate deities. God exercises a moral government; under it the good are happy, while misfortunes happen to the wicked. According to Epictetus, God is the father of men; Antoninus exults in the beautiful arrangement of all things. They did not admit that the Deity intermeddled in the smaller minutiae; they allowed that omens and oracles might be accepted as signs of the foreordained arrangement of God. They held this foreordination even to the length of fatalism, and made the same replies, as have been given in modern times, to the difficulty of reconciling it with Free-will, which in their system was unusually prominent. As to the existence of evil, they offered explanations such as the following: God is the author of all

things except wickedness; the very nature of good supposes its contrast evil, and the two are inseparable, like light and dark; in the enormous extent of the Universe, some things must be neglected; when evil happens to the good, it is not as a punishment but as connected with a different dispensation; parts of the world may be presided over by evil demons; what we call evil may not be evil. Like most other ancient schools, the S. hold God to be corporeal like man; Body is the only substance; nothing incorporeal could act on what is corporeal; the First Cause of all, God or Zeus, is the primeval fire, emanating from which is the soul of man in the form of a warm ether. It is for human beings to recognise the Universe as governed by universal Law, and not only to raise their minds to the comprehension of it, but to enter into the views of the Creator, who must regard all interests equally; we are to be, as it were, in league with him, to merge self in the universal Order, to think only of that, and its welfare. As two is greater than one, the interests of the whole world are infinitely greater than the interests of any single being, and no one should be satisfied with a regard to himself alone. Above the petty events befalling ourselves. The grand effort of human reason is thus to rise to the abstraction or totality of entire Nature. As to Immortality, the S. precluded themselves, by holding the theory of the absorption of the individual soul at death into the divine essence, but, on the other hand, their doctrine of advance and aspiration is what has in all times been the main natural argument for the immortality of the soul. In arguing for the existence of Divine power and government, they employed what has been called the argument from Design, which is as old as Socrates. (2) Next, as to the Constitution of the Mind. We have bodies like animals, but reason or intelligence like the gods. Animals have instinctive principles of action; man alone has a rational, intelligent soul. According to Antoninus we come into contact with Deity by our intellectual part, and our highest life is thus the divine life. But the most important Stoical doctrine respecting the nature of man is the recognition of Reason as a superior power or faculty that subordinates all the rest—the governing intelligence. This, however, is not a mere intellectual principle, but an active force, uniting intellect and will. The bodily sensibilities are opposed to this higher Reason and Will, which, however, is

strong enough to control them. In order to maintain their contrast with the Epicureans, the S. said that pleasure and pain are not principles of Nature. The doctrine called the Freedom of Will may be said to have originated with the S., although with them it was chiefly a rhetorical mode of expressing the dignity of the Wise Man and his power of rising superior to circumstances. (3) We must consider next the Stoical Theory of Happiness, or rather of the Good, which with them was not identified with happiness. They began by asserting that happiness is not necessary, and may be dispensed with, and that pain is no evil, which, however, if followed consistently, would dispense with all morality and all human endeavour. Substantially and practically they held that pains are an evil, but, by a proper discipline, may be triumphed over. They disallowed the direct and ostensible pursuit of pleasure as an end (the point of view of Epicurus), but allured their followers partly by promising them the victory over pain, and partly by certain enjoyments of an elevated cast that grew out of their plan of life. Next to the discipline of endurance we must rank the complacent sentiment of Pride, which the S. might justly feel in his conquest of himself, and in his lofty independence and superiority to the casualties of life. The pride of the Cynic, the S.'s predecessor, was prominent and offensive, showing itself in scurrility and contempt towards everybody else; the Stoical pride was a refinement upon this, but was still a grateful sentiment of superiority, which helped to make up for the surrender of indulgences. The last and most elevated form of Stoical happiness was the satisfaction of contemplating the Universe and God. Epictetus says that we can discern the providence that rules the world if we possess two things—the power of seeing all that happens with respect to each thing, and a grateful disposition. The work of Antoninus is full of studies of Nature in the devout spirit of 'passing from Nature to Nature's God'; he is never weary of expressing his thorough contentment with the course of natural events, and his sense of the beauty and fitness of everything. Old age has its grace, and death is the Stoical in their ideas of the Good, now described. The S. were the first to preach what is called 'Cosmopolitanism'; for although in their reference to the good of the whole they confounded together sentient life and inanimate objects—rocks, plants, etc., solitude

for which was misspent labour—yet they were thus enabled to reach the conception of the universal brotherhood of mankind, and could not but include in their regards the brute creation. They said: 'There is no difference between Greeks and Barbarians; the world is our city.' Seneca urges kindness to slaves, for 'are they not men like ourselves, breathing the same air, living and dying like ourselves?' The Epicureans declined, as much as possible, interference in public affairs, but the Stoical philosophers all urged men to the duties of active citizenship. Although there had been many good and noble men among the pagans, yet positive beneficence had not been preached as a virtue before the S. They adopted the four Cardinal Virtues (Wisdom, or the Knowledge of Good and Evil; Justice; Fortitude; Temperance) as part of their plan of the virtuous life, the life according to nature. Justice, as the social virtue, was placed above all the rest. But most interesting to us are the indications of the idea of Beneficence. Epictetus is earnest in his exhortations to forgiveness of injuries. Antoninus often enforces the same virtue, and suggests considerations in aid of the practice of it; he contends as strongly as Butler and Hume for the existence of a principle of pure, that is, unselfish, benevolence in the mind, in other words, that we are made to advance each other's happiness. There is also in the Stoical system a recognition of duties to God, and of morality as based on piety. Not only are we all brethren, but also the 'children of one Father.' The extraordinary stress put upon human nature by the full Stoic ideal of submerging self in the larger interests of being, led to various compromises. The rigid following out of the ideal issued in one of the Paradoxes, namely, that all the actions of the wise man are equally perfect, and that, short of the standard of perfection, all faults and vices are equal. This has a meaning only when we draw a line between spirituality and morality, and treat the last as worthless in comparison with the first. The later S., however, in their exhortations to special branches of duty, gave a positive value to practical virtue, irrespective of the ideal. The idea of Duty was of Stoical origin, fostered and developed by the Roman spirit and legislation. The early S. had two different words for the 'suitable' (*kathekon*) and the 'right' (*katorthoma*). It was a great point with the S. to be conscious of 'advance,' or improvement. By self-examination he kept himself constantly acquainted with his moral state, and it was both his duty and

his satisfaction to be approaching to the ideal of the perfect man. When renouncing the position of 'wise,' he yet claimed to be advancing. This idea, familiar to the modern world, was unknown to the ancient before the S. It is very illustrative of the unguarded points and contradictions of Stoicism, that contentment and apathy were not to permit grief even for the loss of friends. Seneca, on one occasion, admits that he was betrayed by human weakness on this point. The chief ancient authorities on the S. are the writings of Epictetus, Marcus Antoninus, and Seneca, themselves Stoical philosophers, together

physician, born at Dublin. S. studied under Alison, and took the degree of M.D. in 1825. As hospital physician and instructor of students, S. acquired a great reputation. He has left some medical works which still retain their importance. Cambridge made him an LL.D.

Stokesley, a tn. in the N. Riding of Yorkshire, 9 m. S.E. of Stockton-on-Tees. Pop. (1911) 1600.

Stolberg, a tn. in the Rhine Province, Prussia, 6½ m. to S.E. of Aix-la-Chapelle. It manufs. glass, iron, and zinc goods, and chemicals. Pop. 15,468.

Stolberg, Christian Count (1748-1821), a poet, born at Hamburg. He studied at Göttingen, and became a member of that school of poetry of which Bürger and Voss were members. After retiring from public service he went to live at Eckernförde until his death. He is the author of: *Gedichte*, 1779; *Gedichte aus dem Griechischen*, 1782; *Schauspiele mit Chören*, 1787; *Vaterländische Gedichte*, 1810, and a translation of Sophocles, 1787.

Stolberg, Friedrich Leopold, Count (1750-1819), a German poet and brother to Christian S. (q.v.), was a native of Bramstedt in Holstein. Among his works are: *Geschichte der Religion Jesu Christi*, 1806-18; *Gedichte*, 1783; *Die Jesu*, 1788; and translations of the classics.

Stole, a vestment of the Catholic Church, worn by bishops, priests, and deacons in the administration of sacraments. It is a strip of silk, the colour varying according to the day, 2½ yds. long by 4 in. wide. It is worn by the pope, even when not officiating, as a symbol of the Church's jurisdiction.

Stolen Goods. Possession of S. G. recently after their loss is *prima facie* evidence that the person in possession stole the goods or received them knowing them to have been stolen; but if many months have elapsed between the loss and the discovery the possessor cannot in the absence of any other circumstances implicating him with the theft be called upon to account for the manner in which he came by the goods. This, the doctrine of *Recent Possession*, is really no more than a statement of one kind of presumptive evidence, which may, according to the nature of the property stolen, the time that has elapsed, and so forth, amount either to cogent proof or no proof at all; e.g., if A, a known thief, be found in possession of a stolen horse some months after the theft, the fact of his possession in conjunction with his reputation hardly afford that degree of evidence of complicity that the possession years after the theft of

Stoke Newington, a metropolitan bor. in the N. of London, with large reservoirs and waterworks. Pop. (1911) 50,659.

Stoke-on-Trent, a municipal, co., and parl. bor., and tn. of Staffordshire, England, 14½ m. N. of Stafford, on the Trent and Mersey Canal. The town is famous for its manuf. of pottery and porcelain, being in the centre of the potteries district. It is also engaged in coal mining and the manuf. of machinery and brick-making. Hanley, Burslem, Fenton, Tunstall, Longton, and Stoke were included in the bor. of S.-on-T. in 1910. Pop. (1911) 234,553.

Stoke Poges, a vil. of Buckinghamshire, England, 2 m. N. of Slough. It is the burial place of Gray, the churchyard being identified with the scene of his *Elegy*.

Stokes, Sir George Gabriel (1819-1903), an Irish mathematician and physicist, born in Skreen, co. Sligo, and educated at Pembroke College, Cambridge, where he was appointed Lucasian professor of mathematics in 1849. He was secretary (1854-85), and president (1885-90) of the Royal Society, and fellow (1841-57), and master (1902) of his college. He represented Cambridge in parliament from 1886. See his collected *Mathematical and Physical Papers*, 1880-1905, and *Memoir and Scientific Correspondence of G. G. Stokes*, edited by Sir J. Larmor, 1907.

Stokes, Whitley (1830-1909), a British lawyer and Celtic philologist, born in Dublin, the son of William S. He became a barrister of the Inner Temple (1855), and in 1862 went to India where he became a member of the viceroy's council (1877), and president of the commission on Indian law (1879). He edited many Celtic texts and translated *Lives of Saints from the Book of Lismore*, 1896.

Stokes, William (1804-78), an Irish

a diamond tiara worth about £100,000 would.

Conviction on indictment for theft entails restitution of the S. G. to the rightful owner. But if the S. G. consists of some valuable security or negotiable instrument (*q.v.*) which after the theft has been *bona fide* paid by some person who has rendered himself liable to discharge such security or instrument, the court will not order restitution (*see also under MARKET OVERT*). Goods obtained by fraud or other unlawful means not amounting to larceny (*q.v.*) and transferred to some *bona fide* purchaser will not be restored to the defrauded owner (Sale of Goods Act, 1893). Where S. G. have been sold by the thief to a *bona fide* purchaser the court has power to make an order, on the restitution of the goods to the owner, that out of any money found on the thief on his arrest a sum not exceeding the amount of the proceeds of the sale be paid over to the purchaser. Magistrates in the exercise of their summary jurisdiction also have power to order restitution. If S. G. have been pawned, they will, generally speaking, only be ordered to be restored to the true owner if the amount lent by the pawnbroker was not over £10. (*See also RECEIVING STOLEN GOODS and SEARCH WARRANTS.*)

Stolp, a tn. in the prov. of Pomerania, Prussia, 68 m. N.W. of Danzig, having an ancient church and castle. Pop. 33,768.

Stolypin, Peter Arkazhevich (1863-1911), a Russian statesman; the son of a Russian general, was born and educated at Baden-Baden and at the University of St. Petersburg. He was governor of the province of Saratoff and became Minister of the Interior in the first Duma in 1906 and Premier in July of that year. He vigorously suppressed the revolutionary movement, at the same time preserving representative institutions. A month or so after his appointment an attempt was made upon his life, his villa being wrecked by a bomb. Although both he and Madame Stolypin escaped uninjured, two of his daughters and twenty other persons sustained serious injuries. Having obtained an imperial decree for the alteration of the franchise, he dissolved the second Duma. The third Duma had a large Centro party and was more amenable. He was shot during an interval of the performance at the theatre at Kieff and died two days after.

Stomach, the pear-shaped digestive sac which in man is situated in the upper part of the abdomen, the wider

end to the left, the narrower to the right, but still somewhat to the left of the median line. It is entered by the oesophagus by the *cardiac orifice*, where the circular muscle is thickened to form a sphincter. The opening of the S. into the intestine is called the *pylorus*. The innermost coat of the S. consists of mucous membrane made up of a layer of epithelial cells resting on connective tissue. When the organ is not fully distended, the mucous membrane is thrown into folds called *rugae*, when the S. is distended the rugae disappear. Outside the submucous coat of connective tissue are three coats of unstriated muscle, of which the inner is oblique, the next circular and the other longitudinal. The whole of the organ is embraced by the two layers of the *peritoneum*, the serous membrane which lines the interior of the abdominal cavity. The mucous coat contains gastric glands which secrete gastric juice and mucus. The food enters the S. by the cardiac orifice, and is then acted upon by the gastric juice which contains hydrochloric acid and an enzyme called pepsin. The juice is effectively mixed with the salivated food by the movements of the muscular walls of the S., the degree of distension of the sac being just sufficient to accommodate the contents. When the food is rendered acid by the action of the gastric juice and has been propelled by peristalsis to the pyloric canal, the pylorus opens to admit the food to the small intestine. The effect of digestion in the S. is to convert preteids into peptones. The gastric juice has also some bactericidal influence.

Gastritis is inflammation of the coats of the S. *Acute gastritis* may be set up by a corrosive poison, by the effects of acute fevers as typhus and diphtheria, or by unsuitable food. The flow of gastric juice is arrested, digestion is stopped, and anti-peristalsis may occur, leading to vomiting. The attack tends to subside when the exciting cause is removed, and treatment should be directed to this end. In the case of poisoning, emetics should be used, but the administration of a purgative is less distressing when the irritating substance is indigested food material. Bismuth and restriction to a light diet are of help in soothing the irritated membrane. *Chronic gastritis* or *gastric catarrh* may follow from repeated acute attacks, and is especially associated with the alcoholic habit. The coats of the S. are in a state of chronic congestion, the mucous membrane and in some cases the muscular coat become thickened. The activity of the glands is lessened and the patient becomes a chronic dyspeptic. Treatment

requires patience and perseverance in the subject. If alcohol is the predisposing cause, it should be abandoned, and the diet should be carefully restricted for a protracted period. Bismuth and arsenic are useful in allaying irritation, and peptonised foods help to supply the deficiency in the glands.

Gastric ulcer is commonest in females of an anæmic tendency. It is caused by the S. digesting a part of its own tissue in which the blood-supply is deficient. The ulcer or ulcers usually occur toward the pyloric end, are small and circumscribed, but may tend to eat right through the S. wall, when a fatal ending can hardly be averted. The most characteristic symptoms are severe pain and vomiting immediately after food. The best treatment is absolute rest combined with a milk diet, when the condition may cure itself. Copious hæmorrhage indicating the danger of perforation at an early period, should be met by prompt surgical measures. If perforation has taken place, immediate suturing of the opening and cleansing of the abdominal cavity may lead to recovery.

Cancer of the stomach may follow chronic gastric ulcer and usually occurs at the pyloric end. The symptoms are somewhat indefinite. Discomfort is felt some hours after taking food and vomiting of large masses occasionally occurs. Unfortunately, the condition is generally recognised too late for surgical measures to be of any avail.

Stomach-pump, a pump for withdrawing the contents of the stomach. It is used in cases of poisoning, especially by narcotics. Where there has been any lesion of the coat of the stomach, as by a corrosive poison, its use is detrimental.

Stomata, the minute openings in the epidermis of the leaves of plants by means of which the plant tissues are in communication with the external atmosphere allowing the absorption or emission of gases and of aqueous vapour. They open in the light and close in darkness. They are most numerous on the under surfaces of leaves, but occur on all parts of plants above ground.

Stone, in medicine, see CALCULUS, GALLSTONES, LITHOTOMY.

Stono (for the chief types of S. used in architecture, see BUILDING STONES. For dressing S., see MASONRY). *Preservation*: A method of preserving S. from the ravages of the atmosphere is of vital importance. For sandstones a coating of boiled linseed oil or oil paint is employed. Ransome suggested a coating of alkaline silicates followed by applica-

tion of calcium chloride. *Artificial*: As a substitute for natural S., artificially made bricks of burnt clay, or terra-cotta blocks, are largely used. Ransome's artificial S. is made by pressing in moulds a mixture of sodium or potassium silicate (soluble glass, *q.v.*) with sand. When partially dry the blocks are soaked in calcium chloride solution. Calcium silicate is formed and compacts the mass. Portland cement is also used for artificial S. See CONCRETE.

Stone, a standard British weight, called the imperial S., is 14 lbs. Other Ss. in use are 8 lbs. for meat, 24 lbs. for wool, 16 lbs. for cheese, 5 lbs. for glass, and 32 lbs. for hemp.

Stone: 1. A tn. of Staffordshire, England, on the Trent, 7 m. N. of Stafford. It is an old town and is engaged in shoemaking and brewing. Pop. (1911) 5690. 2. A vil. of Kent, England, 4 m. W. of Gravesend, on the Thames. Pop. (1911) 5100.

Stone, Edmund (d. 1768), a celebrated Scottish mathematician. He found a benefactor in the Duke of Argyle, to whom his father was gardener, and was thus enabled to pursue his favourite studies. In 1723 he published a work on *The Construction and Principal Uses of Mathematical Instruments*, followed by *A New Mathematical Dictionary* and *The Method of Fluxions*. In 1725 was admitted a fellow of the Royal Society.

Stone, Edward James (1831-97), an astronomer and fellow of the Royal Society and president of the Astronomical Society (1882-84). S. held the appointment of chief assistant of the Greenwich Observatory, and later in life took up the post of astronomer-royal at the Cape of Good Hope. He published a set of *Tables for Facilitating the Computation of Star-constants*.

Stone, Marcus (b. 1840), a painter of subjects of human interest. He has become known as the inventor of a type of illustration characterised by prettiness and a rather facile grace. Most of his work has been reproduced in one form or another. He was made an A.R.A. in 1877, and was elected to membership of the Royal Academy in 1887, where his work is usually exhibited. He has received medals from many international exhibitions.

Stone, Nicolas (1586-1647), born at Woodsbury, near Exeter. He lived three years in London with one Isaac Jones, his master, and then went to Holland, where he worked for Peter de Reyser. In 1619 he was appointed the new
all; and
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Abbey:

among them one to Spenser. S. had three sons, Henry, Nicholas, and John. *Henry Stone* (d. 1653) was a statuary and painter. He studied in Italy and the Netherlands, and made many excellent copies of celebrated Italian and Flemish pictures. There is a large copy at Hampton Court of the celebrated picture, by Titian, of the Cornaro family, now in the possession of the Duke of Northumberland. *Nicholas Stone* (d. 1647), the second son, who was a statuary, also studied abroad, and modelled many excellent copies of celebrated works.

Stone, Samuel (1602-63), an English Puritan divine, born in Hertford. With Thomas Hooker he settled in New England (1633) and was appointed teacher at Newtown (Cambridge). In 1636 they removed to Hartford in Connecticut. S. published *A Congregational Church, a Catholic Visible Church* in 1652.

Stone Age. The history of man's gradual advancement in civilisation has been divided by archaeologists into three ages: (1) Stone Age, (2) Bronze Age, (3) Iron Age. The S. A., in which man used implements of stone, has been divided into (a) The Older S. A. or Palæolithic, and (b) The Newer S. A. or Neolithic. The men of the Palæolithic Age were hunters, and the remains of successive hunting races have been found in the deposits of caves, river gravels, and other sediments. This Palæolithic series has been divided into Upper, Lower, and Middle groups, and the groups further subdivided into stages thus:—

Upper	Magdalenian Stage
Palæolithic	Solutrian "
	Aurignacian "
Middle	Mousterian "
Lower	Acheulian "
	Chellean "
	Strepyan "
	Mesvinian "

Palæolithic men were nomadic, followers of the chase, and they used implements of rough unpolished stone. These earlier flaked stone implements are found in terrestrial or fluvial deposits, and occur in association with relics of northern (mammoth, reindeer, cave-bear) and southern mammalia (lion, leopard, hippopotamus). The dwellings of Palæolithic men were caves, and the walls of these caves are covered with rough sketches of animals belonging to that period. Some of these sketches are painted in tints of red and brown, e.g. the cave at Font-de-Gaume near Eyzies in Dordogne. The men who inhabited the caves of Europe in Palæolithic time were very similar to

the modern Eskimo. The Neolithic implements occur in river-terraces, alluvial deposits, lake dwellings, and in a few caves in layers above the Palæolithic relics. That Neolithic man was more cultured than the Palæolithic is shown by the fact that his weapons and tools were made of highly polished stone. With the relics of Neolithic man are found remains of animals which show that typical glacial fauna had died out. The woolly rhinoceros and mammoth had become extinct. Remains of the Irish elk, the reindeer, beaver, brown bear, etc., are abundant. Besides these wild animals, the remains of domesticated forms such as the cat, horse, sheep, dog, and goat, all of which were not part of the indigenous fauna of Europe, point to the fact that Neolithic man was not nomadic as the Palæolithic man. The tribes were acquainted with agriculture, and were advanced in the arts of weaving and pottery-making. Against the classification of the S. A., according to the nature of its weapons, into an earlier flaked and a later polished S. A., it has been argued that the division should be arranged according to the most fundamental differences into a hunting and an agricultural stage. See Solla, *Ancient Hunters*, 1911; Boyd Dawkins, *Early Man in Britain*, 1880; Sir John Lubbock, *Prehistoric Times*, 1865, etc., etc. See also **ARCHAEOLOGY**, **BRONZE AGE**, and **IRON AGE**.

Stone-chat, or *Praticola rubicola*, a small bird of the family Turridæ. The male bird has a black head and throat, dark back, and tawny breast, and the female differs from it in that its head is brown. It is frequently seen in Britain.

Stone Circles, see **CIRCLES OF STONE**.

Stone Coal, see **ANTHRACITE**.

Stone-crop, see **SEDUM**.

Stonefield, a tn. of Lanarkshire, Scotland, situated to the S.E. of Glasgow. Pop. (1911) 7300.

Stone-fly, a name given to any of the orthopterous insects of the order Plecoptera. The species are of wide distribution and frequent running streams. The larvæ are deposited in water and are usually found under stones.

Stoneham, a tn. in Middlesex co., Massachusetts, U.S.A., 9 m. N. of Boston. Its chief manufs. are boots, automobiles, and chemicals. Pop. (1910) 7090.

Stonehaven, or **Stanehive**, a watering-place, burgh, and co. tn. of Kincardineshire, Scotland, on Stonehaven Bay, 23 m. N.N.E. of Montrose. There is a secure harbour, and distilleries and tanneries. The ruins of

Dunnottar Castle are in the vicinity. Pop. (1911) 4266.

Stonehenge (Saxon *Stanhengist*, hanging stones), a circular group of tremendous standing stones on Salisbury Plain, 2 m. from Amesbury in Wiltshire, England. It is situated among a series of prehistoric barrows of the Bronze Age, and is probably only a small portion of its enclosed with-
300ft. in dia-
N.E. end by
uter circle of
trilithons, 100 ft. in diameter, composed of 'sarsens,' or monoliths, of Tertiary sandstone, originally thirty in number, and set up at regular distances of about 4 ft. Concentric with this circle, 9 ft. inwards, is a second circle formed of 'blue stones,' or undressed boulders of primitive rock, originally forty in number and irregular in shape and height. Within are two ellipses, the outer one, nearly of horse-shoe form, containing five trilithons, formed by ten sarsens, the inner one, smaller and of the same shape, being made up of blue stones, originally nineteen in number. Near its central curve lies the 'Altar Stone,' 15 ft. long and over 4 ft. wide. To the N.E., standing outside the circle, is a huge monolith, the so-called 'Friar's Heel.' The open part of the horse-shoe is on a line with this stone, almost facing the sun-rise. This fact has been advanced to support a theory that S. was a temple for sun-worship, and Sir Norman Lockyer has shown in *Stonehenge and other British Stone Monuments* (1906) that, taking into account astronomical causes, the sun rose exactly above that spot in 1680 B.C., the possible date of erection. Other theories regarding its origin are: That it was a monument to the 400 nobles slain by Hengest (472); that it was moved from Ireland by Merlin; and that it was a burial place of Boadicea. As a temple it has been ascribed to the Romans, Druids, Phoenicians, Saxons, and Danes. Excavations were made in 1901, and stone tools, coins, bones, and fragments of pottery were found. From the architectural standpoint it seems probable that it dates back to the Bronze Age. Consult Barclay, *Stonehenge and its Earthworks* (1895), Wiltshire
(Dec. 1901
and Sir N.
henge . . .

Stonehenge, the nom de plume of John Henry Walsh (1810-88), an English author, born in London. He obtained his qualifications as a surgeon and had practices in London and Worcester until 1852. In that year, however, he fixed his residence

in London, and in 1857 became the editor of *The Field*. He has published numerous works on sport, among them: *The Greyhound*, 1853; *British Rural Sports*, 1856; *The Dogs of the British Islands*, 1867.

Stonehouse: 1. Or East S., a tu. in Devonshire, England, situated between Devonport and Plymouth, with which it forms the 'Three Towns.' Pop. (1911) 13,754. 2. A vil. of Gloucestershire, England, 3 m. W. of Stroud; engaged in the woollen manuf. Pop. (1911) 2200. 3. A tn. of Lanarkshire, Scotland, 7 m. S.E. of Hamilton, on Avon Water. Pop. (1911) 3688.

Stone River, Tennessee, U.S.A.; on it stands Murfreesboro, near the site of an indecisive battle between the Federal army, under Rosecrans, and the Confederates under Bragg, in 1862 and 1863.

Stones, Precious. The subject of P. S. in relation to jewellery having been dealt with in the article GEM, the purpose of this article is supplementary, viz. to give a few facts and fancies with regard to the stones *per se*. From time immemorial certain stones have been thought, in some subtle way, to have a connection with the influence of the planets; in other words, the alchemist joined hands with the astrologer. The following list, which is taken from the interesting little brochure issued by Messrs. C. Calpé, 43 Poland Street, London, W., gives a list of stones in relation to the Signs of the Zodiac and to the Planets, in the latter case the metals being added. The Zodiac: Aries, ruby; Taurus, topaz; Gemini, carbuncle; Cancer, emerald; Leo, sapphires; Virgo, diamond; Libra, jacinth; Scorpio, agate; Sagittarius, amethyst; Capricornus, beryl; Aquarius, onyx; Pisces, jasper. The Planets: Saturn, turquoise and lead; Jupiter, carnelian and tin; Mars, emerald and iron; Venus, amethyst and copper; Mercury, loadstone and quicksilver; Moon, crystal and silver; Sun, diamond and gold. Another pleasing fancy is that certain stones are more appropriate to a person according to the month in which he or she is born. The following is a list of 'birth-day stones': January, garnet; February, amethyst; March, blood-jasper; April, diamond and re; May, emerald; June, agate; July, ruby; August, sardonyx; September, crystal; October, opal; November, topaz; December, turquoise. The twelve different precious stones in the breast-plate of the High Priest of the ancient Hebrews are well known: 1st, sardius; 2nd, topaz; 3rd, carbuncle; 4th, emerald; 5th, sapphires; 6th, diamond; 7th, jacinth;

8th, agate; 9th, amethyst; 10th, crysolite, 11th, onyx; 12th, jasper; but that tradition has assigned a precious stone to each of the Twelve Apostles is not generally known. They are as follows: Simon Peter, jasper; Andrew, sapphire; James, carbuncle; John, emerald; Philip, sardonyx; Bartholomew, sardius; Thomas, beryl; Matthew, crysolite; James the Younger, topaz; Jude, cryopraxe; Simon, jacinth, Mattheus, amethyst. Leaving fancy and turning to scientific fact we find that the diamond is the hardest stone and that the little known zircon has the greatest specific gravity. A list of the relative hardness and of the relative specific gravity of some of the chief stones is: *Hardness*: Diamond, 10; corundum (ruby, sapphire, etc.), 9; chrysoberyl, 8½; topaz, spinel, 8; beryl, emerald, aquamarine, 7½; zircon or jargon, 7½; garnet (red), tourmaline, 7½; quartz, crystal, amethyst, jasper, cryopraxe, 7; chalcedony, carnelian, 6½; turquoise, 6; opal, 5½-6½; jet, 3½; amber, 2½. *Specific gravity*: Jargon or zircon, 4.7; garnet, 4.2; ruby and sapphire, 4.0; alexandrite, chrysoberyl, cat's-eye, spinel, 3.6; diamond, 3.52; topaz, crysolite, and peridot, 3.4; tourmaline, 3.0; turquoise and emerald, 2.7; amethyst, 2.6; moonstone, 2.39; opal, 2.21. **See GEM.**

'Stonewall' Jackson, *see* JACKSON, THOMAS JONATHAN.

Stoneware, *see* POTTERY.

Stone Worship, *see* FETISHISM, and IDOLATRY.

Stonhouse, Sir James (1716-95), an English physician and divine, studied at St. John's, Oxford, and at St. Thomas's Hospital, London. He founded a county infirmary at Northampton, where he practised from 1743-63. Taking holy orders in 1749, he was appointed to the rectory of Little Cheverell (1764) and Great Cheverell (1779), and subsequently preached in Bath and Bristol. He published many religious tracts, and also *Everyman's Assistant and the Sick Man's Friend*, 1788.

Stonington, a popular watering-place of Connecticut, U.S.A., in New London co., situated on Long Island Sound, 40 m. S.W. of Providence. Pop. (1910) 9154.

Stonyhurst, a Roman Catholic College, 4 m. S.W. of Clitheroe in Lancashire, England. It had its origin in the College of S. Omer, founded in France in 1592. The members of the latter took refuge in Bruges and in Liège during the 18th century, after the suppression of the college in France, and eventually were offered a place at S. by Mr. Weld. There are about 300 students,

the curriculum including classics and the sciences.

Stony Stratford, a tn. of Buckinghamshire, England, on Watling Street and the R. Ouse, 7 m. N.E. of Buckingham. It has engineering works. Pop. (1911) 2500.

Stool-ball, an English game, extremely popular between the 15th and 18th centuries. It was played by two people, the aim of the one being to strike the stool with the ball, and that of the other, who placed himself in front of the stool, to prevent his opponent's so doing. *See* Strutt, *Sports and Pastimes of the People of England*, 1903.

Stool of Repentance was either a seat or pew in churches in Scotland, in which persons who had come under the censure of the ecclesiastical authorities for some sin, such as drunkenness or lying, were made to stand.

Stools, the evacuations from the bowels. Normally they consist of undigested food, digestive juices not absorbed, fragments of epithelium, etc. In disease of the alimentary canal they often give valuable diagnostic indications, through the presence of blood, mucus, casts, parasites, bacteria, etc. Constriction of the intestine is sometimes shown by small round masses, called sheep-dung S. Lead-pencil S., or faces of small diameter, are not necessarily indicative of intestinal stricture.

Stopford, Sir Robert (1768-1847), an English admiral, seized a number of French privateers in the Bay of Biscay (1799), and in 1802 was supervising the execution of the Peace of Amiens in the W. Indies. He received a gold medal for the part he played in the battle of San Domingo (1806). In 1840, with Napier's assistance, he seized Sidon and Beyrout, and successfully stormed Acre, thus relieving the sultan of all danger from Mehemet Ali.

Stop-order. The effect of obtaining a S. on a fund in court is to stop the payment out to any person other than he who has obtained the S. Ordinarily the assignee of a chose in action (*q.v.*) must give notice (*see* NOTICE) to the legal holder in order to perfect his title as against third persons who may have charges on the same property; but when the chose in action is in court a S. is required in lieu of a notice.

Stoppage in Transit, the right conferred on the unpaid vendor of goods who has parted with the goods to stop them on the insolvency of the buyer, before they have reached the latter's actual or constructive possession, and to resume possession until they are paid for. S. in T.

differs from lien (*q.v.*) in two respects: it can be exercised only when the buyer is insolvent and only when the goods have left the possession of the seller. The effect of S. in T. is not to rescind the sale, and, indeed, the buyer can recover damages if the vendor re-sells when he ought not. But in some cases the vendor may at once resell against the buyer.

- (1) Where the goods are perishable.
- (2) Where the right of re-sale was expressly reserved in the contract of sale. Apart from these cases the seller must give notice of his intention to resell, and also give the buyer a reasonable opportunity to pay or tender (*q.v.*) the price.

Storage, Stephen (1763-96), a violinist and composer; studied at Naples; as a boy-prodigy he could play the most difficult works of Tartini. After touring Italy he reached Vienna, where he produced two operas, *Gli Sposi malcontenti* (1785), and *Gli Equitoci* (1786), and some chamber-music, incidentally meeting Mozart. He returned to England in 1787, and produced with the greatest success the operas, *The Haunted Tower*, 1789; *The Siege of Belgrade*, 1791; and *The Pirates*, 1792, his finest achievement.

Storage Batteries, see ACCUMULATORS.

Stora Tuna, a com. 13 m. by rail N.W. of Bispherg, in the prov. of Kopparberg, Sweden. Pop. 19,453.

Store (late Lat. *staurum*, a supply, etc.), a stock or supply of any commodity or commodities kept either for a specific purpose, for ordinary use, or for an emergency. In military language *stores* mean ammunition, arms, accoutrements, etc., and various special kinds of stores which are required by the Royal Engineers, the Royal Artillery, the Royal Army Medical Corps, and the Army Veterinary Corps. The ordinary stores are supplied by the Army Ordnance Department, over which is the quartermaster-general. The word *store* is used in America for the 'general utility' shop of the more outlying districts, and for a shop in general (dry goods store, etc.), whilst 'stores' in England are huge establishments which combine in themselves every variety of retail shops.

Storing Fruit. Late apples and pears can be kept in good condition for several months if perfectly healthy, sound, and dry. For the purpose, a cool, ventilated, but frost-proof store-room is necessary. The fruits should be spread out on clean boards so as not to touch each other. Pears need a rather drier and warmer atmosphere than apples. Grapes, if free from mildew, can be kept for a long time if the bunches are cut with a few inches of

lateral stem attached and this placed in a bottle of water.

Stork (*Ciconia*), a genus of wading birds with long conical bills, long three-toed legs, and large wings. The white or house S. (*C. alba*) was formerly plentiful in Britain, but is now only an occasional visitor. It is widely distributed on the continent, in many parts of which it is strictly protected for its service in destroying reptiles, small mammals, and insects, and in devouring offal. Its great clumsy nest is often to be seen on a house top or church spire. Its plumage is greyish white, its quills and longest feathers on the wing coverts black, and the head and legs red. The black S. (*C. nigra*) has the upper surface black and the lower parts white. This species also is protected, and, during migration, occasionally strays to Britain.

Stork, Abraham (d. 1708), a Dutch marine and landscape painter, born at Amsterdam. His sea-views are particularly bold and spirited, and there is a picture by him of the old harbour, Rotterdam, in the Rotterdam Gallery.

Storm, an atmospherical disturbance in which the wind attains a velocity up to about 40 m. per hour. Various forms of these disturbances are manifest. In some regions sudden

Ocean. The eddy type of S. has received most attention; these Ss. are known under various local names, e.g. hurricanes, typhoons. The general name proposed is cyclones (*q.v.*) owing to the supposed circular motion of the wind. The wind, however, has more probably a spiral motion, incurring towards the centre. One of the com-

mon N. winds is the 'storm' or 'the storm' area of low barometric pressure. See CYCLONES, TYPHOONS.

Storm, Gu (Norwegian hist. Chief among the Cycle of Didrik Bern; *Studies on Travels in Finland; The Saga of Erik the Red; Monumenta historica Norvegiae; Regesta diplomatica Norvegiae*, etc.

the service of Schleswig-Holstein and

Prussia. First became known as a lyric poet by his *Gedichte* (12th ed., 1900), and his first novel was *Im-mensee* (51st ed., 1901) which gained him general recognition, and was followed by numerous other short stories, including: *Psyche*; *Hans und Heinz Kirsch*; *Der Schimmelreiter*, etc. See *Lives* by Schütze, 1887, and P. Remer, 1897.

Storm Warnings, see WEATHER FORECAST.

Stornoway (Stjarna's Vagr or Bay), a seaport and police burgh of Lewis Is. (E. coast), Outer Hebrides, Ross-shire, Scotland, on S. Harbour, 180 m. N.W. of Oban. Its castle was completed in 1870. It is the chief town in the Western Isles, and an important fishing centre (especially for herrings). Pop. (1911) 3810 (nearly trebled in the fishing season). See *Black's Princess of Thule*.

Storthing (Danish, high court), the national parliament of Norway, the representatives of which are elected triennially. The S. is convened every year, and is divided into a Lagthing or Upper House, composed of one-fourth of the members, and a Odels-thing or Lower House, composed of the remainder.

Story, Joseph (1779-1845), an American jurist, born at Marblehead in Massachusetts, U.S.A. He entered Harvard University in 1795, and in 1801 was called to the bar, and speedily obtained extensive practice. In 1805 he became a member of the legislature of Massachusetts, and he continued a representative till he was made a judge. In 1811 he was appointed an associate justice of the Supreme Court of the U.S.A. The result of his practical experience was his *Commentaries on the Conflicts of Laws* (1834), which gained him a reputation in Europe. In 1830 he was appointed to the newly-founded chair of jurisprudence in Harvard University; and during the time that he held this professorship he wrote his numerous legal treatises: *On the Law of Agency*, *On the Law of Partnership*, *On the Law of Bills of Exchange*, *On the Law of Bailments*, *On Equity Jurisprudence*, and *On Equity Pleading*.

Story, Robert Herbert (1835-1907), a Scottish theologian, born at Roseneath, Argyllshire, and educated in Edinburgh, Heidelberg, and St. Andrews. Ordained in 1859, and appointed to the parish of Roseneath the next year, on his father's death. In 1886 he became professor of ecclesiastical history in Glasgow University. His numerous publications include: *Creed and Conduct*; *Health Haunts of the Riviera*; *William Carstairs*; *Nugæ Ecclesiasticæ*, etc., and

he is editor of a work on the *Church of Scotland, Past and Present*, 1890-91.

Story, William Wetmore (1819-95), an American sculptor, poet, and author, born at Salem, Massachusetts. He executed numerous monuments, statues, and busts, amongst them being 'Cleopatra' and the 'Libyan Sibyl' in the London Exhibition (1862), and the 'Peabody' statue in front of the Royal Exchange, London. His publications include: *The American Question*; *Roba di Roma*; *Nero*; *He and She*; *Poems* (1885), etc. See *Life* by H. James (1903).

Stothard, Charles Alfred (1786-1821), an ingenious antiquarian draughtsman, born in London, son of Thomas S. After studying successively at the Royal Academy, Life Academy, and at the British Institute, Pall Mall, he began in 1810 his first historical piece, 'The Death of Richard II. in Pomfret Castle,' and the following year he was induced to publish the first part of a valuable work on *The Monumental Effigies of Great Britain*. In 1815 S. was appointed historical draughtsman to the Society of Antiquities, and was deputed by that body to make drawings from the Bayeux tapestry. In 1819 he laid before the society a complete series of the drawings from the Bayeux tapestry, and the same year was elected a fellow. In 1821 he went to Beer-Ferrers, Devonshire, and while tracing the portrait of Sir William Ferrers in the E. window of the church, he fell from a height of 10 ft. and was killed. His widow and her brother completed his *Monumental Effigies*, which he left unfinished. His biography was written by his widow, afterwards Mrs. Bray, a popular writer of novels and books of travel.

Stothard, Thomas (1755-1834), an English artist, born in London. He entered the Royal Academy schools in 1777, and began to exhibit his pictures in the following year. He was elected an academician in 1794. It is, however, as an illustrator that he is best known and most highly appreciated. He illustrated the novels of Richardson, Fielding, Smollett, and Sterne, as well as such standard works as *Robinson Crusoe*, *Gil Blas*, and *Tristram Shandy*.

Stoughton, a tn. of Norfolk co., Massachusetts, U.S.A., 18 m. W. of Boston. Manufs. include cardigan jackets, boots, shoes, and rubber. Pop. (1910) 6315.

Stoughton, John (1807-97), an English Nonconformist minister and historian, born in Norwich. He was a student at Highbury College, and was ordained in 1833. In 1872 he became professor of theology in New

College, St. John's Wood. His works include: *Church and State Two Hundred Years Ago*, 1862; *Ecclesiastical History of England*, 1867; and *Lights and Shadows of Church Life*, 1895.

Stour, the name of three English rivers: 1. The boundary between Suffolk and Essex; it flows into the estuary of the Orwell at Harwich. It is navigable to Sudbury. Length 47 m. 2. The Great S., rises near Lenham, Kent, and flowing past Ashford, Canterbury, and Sandwich, it enters Pegwell Bay. Length 40 m. It has two tributaries, East S. and Little S. 3. A trib. of the Hampshire Avon, rises in Wiltshire, and flowing through Dorsetshire and Hampshire joins the Avon at Christchurch. Length 55 m.

Stourbridge, a market tn. of Worcestershire, England, in the Droitwich parl. div., 4½ m. S. by W. of Dudley. It has a town hall (1887), an Edward VI. grammar school (1552), which Dr. Johnson attended (1726-27), a blue coat school (1667), and glass manufactures, established by Hungarian emigrants about 1556. Other manufs. include earthenware, nails, chains, parchment, leather, etc. Pop. (1911) 17,316.

Stourbridge Fair, see FAIR.

Stourport, a tn. in the co. of Worcester, England, sited at the junction of the Severn and Stour, here crossed by a handsome bridge, 4 m. S. of Kidderminster. It is a centre of inland navigation, with iron, carpet, and tanning industries. Pop. (1911) 4432.

Stout, an alcoholic beverage, greatly consumed in England, concocted from a brew of ordinary and burnt malt, with caramel and malt substitutes added. Alcohol, carbohydrates, organic acids, and water are the principal constituents of the finished product. There are several varieties of S., such as oatmeal, invalid, etc. In neuralgia troubles the drinking of S. is often very beneficial.

Stouthrief, in Scots law, an obsolete term used to denote the crime of despoiling a house with violence to the inmates.

Stovaine, see ANÆSTHESIA.

Stove, see HEATING.

Stove Houses, see HOTHOUSE.

Stow, a par. of Midlothian, Scotland, on the Gala Water, 4½ m. W.S.W. of Lauder. It has woollen mills. Pop. (1911) 1317.

Stow, John (1525-1605), an English antiquary, born in London, is best remembered by his *Survey of London* (1558). He edited Chaucer's *Works* (1561) and published the *Chronicles of Matthew Paris* (1571) and Thomas Walsingham (1574). His

Survey of London has more than once been reprinted (see Everyman's Library).

Stowe, Harriet Elizabeth Beecher (1812-96), an American novelist and philanthropist, born at Litchfield in Connecticut, U.S.A. Her father, Lyman Beecher, was president of the Lane Theological Seminary at Cincinnati, and in 1836 Harriet married one of the professors, Calvin Ellis S. Her first publication was *The Mayflower* (1843). *Uncle Tom's Cabin* appeared in *The National Era*, in serial form, in 1850, and on its publication as a book two years later attained an almost unexampled popularity. Half a million copies were sold in the United States and it was translated into twenty-two foreign languages. Feeling that she had a message to deliver, she visited England in 1853 to lecture on the slavery question. Her succeeding novels were: *Dred: a Tale of the Dismal Swamp*, 1856; *The Minister's Wooing*, 1859; and *Old Town Folks*, 1869. See *Lives* by C. E. and L. B. Stowe and Annie Fields (1899).

Stowell, Lord, see SCOTT, WILLIAM.

Stowmarket, a market tn. of Suffolk, England, on the Gipping, 12½ m. N.W. of Ipswich. It manufs. iron, bricks, agricultural implements, gun-cotton, automobiles, etc. Pop. (1911) 4230. See Hollingsworth's *History of Stowmarket*, 1844.

Stow-on-the-Wold, a market tn. of Gloucestershire, England, 15 m. N.E. of Cheltenham. Pop. (1911) 1301.

Strabane, a tn. in co. Tyrone, Ireland, on the R. Mourne, 13 m. S.W. of Londonderry. It has numerous orchards and market gardens, while large quantities of grain are exported. Shirt making is the chief industry. Pop. (1911) 5107.

Strabismus, see SQUINTING.

Strabo (c. 63 B.C.-25 A.D.), a Greek geographer and historian, born at Amasia in Pontus. He travelled extensively in Greece, Italy, Egypt, Sardinia, and Ethiopia. His historical memoirs remain only in fragments, but his *Geographica*, the most important work of antiquity on that science, is extant, almost complete, in seventeen books. The chief editions are: Aldine (Venice, 1516), Casaubon (1587), Müller (1853), Meineke (1866-77), and Tozer (Oxford, 1893).

Strachey, John St. Loe (b. 1860), an English newspaper proprietor and man of letters, was the second son of Sir Edward S. He edited the *Cornhill* (1896-97), and is now the editor and proprietor of the *Spectator*. His publications include: *From Grave to Gay*, 1896; *Practical Wisdom of the Bible*, 1908; and *A New Way of Life*, 1909.

Strachey, Sir John (1823-1907), an Indian administrator, brother of Sir Richard S., born in London. Entered the Bengal civil service in 1842, and on the assassination of Lord Mayo in 1872, acted as viceroy of India. Two years later he was appointed governor of the North-West Provinces. Published *India, its Administration and Progress*, and *Hastings and the Rohilla War*.

Strachey, Sir Richard (1817-1908), an Indian soldier of distinction, who served in the Mutiny of 1857-58, and the Mutiny of 1857-58.

organising abilities, which the authorities were not slow in using to good purpose in the administration of the country. He served in the India Office, and was made a member of the India Council. He was made a C.S.I. and G.C.S.I.

Strada, Famiano (1572-1649), a Jesuit priest, professor of rhetoric at the Gregorian College in Rome. He is chiefly remembered for his history of the revolt of the Netherlands against Spain, entitled *De Bello Belgico ab Excessu Caroli V. ad annum 1590*. He also published *Prolusiones*, essays on classical literature. All his writings are in Latin.

Strada (or Stradanus), John (1536-1604), a noted Flemish painter, born at Bruges; excelled as a painter of animals, hunting-scenes, etc. One of his best known pictures is the 'Crucifixion' in the Church of the Annunciation at Bruges.

Stradbally, a tn. of Queen's co., Ireland, 6½ m. E. of Maryborough. Pop. (1911) 950.

Stradella, Alessandro (c. 1645-c. 1681), a composer of operas and church music, born at Naples. Little is known of him except that he was murdered at Genoa. He is credited with ten operas, eight oratorios, including *S. Giovanni Battista* (published 1676), and a quantity of cantatas and madrigals.

Stradivari, Antonio (1644-1737), the perfecter of the violin, associated with Cremona. He was an apprentice under Niccolò Amati, and until 1684 devoted himself chiefly to small models in the Amati style. The period 1684-90 was one of transition; in 1690 he began making 'Long Strads,' and finally, after 1700, he discarded the Amati style and pursued original lines. Some famous 'Strads' are the Boissier (formerly owned by Sarasate) and the 'Alard,' considered his masterpiece. He is famous also as a maker of violas and violoncellos. See *Life* by Messrs. Hill (now ed., 1909).

Straelen, a tn. in Rhenish Prussia, 27 m. N.W. of Düsseldorf. Its chief

manufs. are cotton and woollen goods. Pop. 6154.

Strafford, Thomas Wentworth, first Earl of (1593-1641), an English statesman, born in Chancery Lane, London, and educated at St. John's College, Cambridge. In 1611 he married Lady Margaret Clifford, and in 1615 became *custos rotulorum* for the W. Riding, an office from which he was dismissed in 1626, being imprisoned in the same year for refusing to pay the forced loan. In the third Parliament of Charles I., Wentworth was the leader of the House of Commons, but in opposition to the king's ministers rather than to the king himself. In 1628 he was raised to the peerage, made president of the Council of the North, and in the following year was created a privy councillor. He had married in 1625 (his first wife having died in 1622) Lady Arabella Holles, and on her death in 1631, he married in the following year Elizabeth Rhodes. In January 1632 he was appointed lord deputy of Ireland, but did not arrive there until July 1633. Under his 'thorough' system of government Ireland reached a pitch of prosperity to which it has attained neither before nor since. His aim was to make Charles an absolute despot, but there is no doubt that the country reaped much benefit from S.'s firm and wise rule. In 1640 he was created Earl of Strafford and Lord-Lieutenant of Ireland, and paid the penalty for being the chief obstacle in the path of the reformers, and was impeached of treason by the Long Parliament. The twenty-eight charges could not be proved, but a bill of attainder was brought in by the Commons, and passed in April 1641, and S. was executed on May 12, 1641, having exonerated the king from his promise that he should not suffer in life or fortune. See *Lives* by E. Cooper (1874) and Traill (1889). See also CHARLES I., LAUD, etc.

Strahan, or Macquarie Harbour, a seaport on the W. coast of Tasmania, Australia, and on the N.E. of Macquarie Harbour. Pop. 2000.

Strahlegg Pass, a glacial pass of the Bernese Alps, Switzerland, leading from Grindelwald to the Grimsel hospice. Height 10,995 ft.

Strain and Stress. Stress is the mutual action of the particles of a body. As every action is accompanied by a reaction, all forces are stresses. The change of form due to a stress is called a strain. A longitudinal stress, in which the forces are in the direction of the length, may be either a pull or a push. In the case of a pull the strain consists of an increase in length and a diminution in girth; in a push, the strain consists

of a decrease in length and an increase in girth.

Straits Settlements, a crown colony of Great Britain, comprising Singapore, Labuan, Penang, the Dindings, Province Wellesley, Malacca, and a number of small islands. They are situated in the E. Indies, on and off the Malay Peninsula. The total area is estimated at 1650 sq. m. (For particulars, see respective articles.) The colony is administered by the Governor, assisted by an Executive Council of the Colonial Office. The Governor is also Attorney-General, and Resident Councillor of Penang) and a Legislative Council (composed of ten official and eight unofficial members). It was transferred from the control of the Indian government to that of the Secretary of State for the Colonies in 1867. The chief exports are sugar, pepper, sago, rice, gum, indiarubber, tobacco, coffee, etc. In 1911 the value of imports was £1,272,240, and of exports £1,272,240.

Penang there is an electric tram system. The total pop. in 1911 was 714,069, of which 240,206 Malays, 369,843 Chinese, and natives of India. See *Straits Settlements Blue Book*, 1913.

Stralsund, a seaport of Germany, in the Prussian prov. of Pomerania, on the Strela Sound, is connected with the mainland by bridges. It has an old town-house (1306) and four Gothic churches. The houses are gabled and give a quaint, old-fashioned appearance. Leather, oil, sugar, playing cards, soap, cigars, etc., are manufactured. The town was founded by Prince Jaromar I. of Rügen about 1209, and became an important member of the Hanseatic League. It withstood a siege by Wallenstein (1628) during the Thirty Years' War. It was ceded to Sweden in 1648 and restored to Prussia in 1815. Pop. 33,981.

Stramonium, in pharmacology, the dried leaves of *Atropa belladonna*, etc. The leaves are smoked in a pipe or in the form of cigarettes for asthma.

Strand Magazine, the pioneer English monthly magazine of light popular literature and illustrations. Founded in 1842 (afterwards Sir George W. T. Stead, the latter being the chief editor. Stead and Newnes separated a year later when Newnes had the sole direction of the periodical. The seal of success was early set upon the venture by the now classic 'Adven-

tures of Sherlock Holmes,' by Mr. (now Sir) Arthur Conan Doyle, while more recent numbers have been characterised by the no less classic humorist, Mr. W. W. Jnoobs, with his brilliant studies of Thames river-side low life. Other notable series are Sir A. Conan Doyle's 'Adventures of Brigadier Gernard,' and the 'Hound of the Baskervilles.'

Strange, Sir Robert (1721-92), a Scottish engraver, born in Orkney. He studied engraving for a while in Edinburgh, but on the outbreak of the Jacobite rising in 1745 he joined Prince Charles's army. After Culloden he perforce left Scotland for the Continent, but eventually he was allowed to return home; and five years before his death he was knighted by George III. S. did a vast number of plates after the old masters, while his works also include a fine original engraving of Prince Charles. See James Denham Stowe, *Memoirs of Sir Robert Strange*, London, 1855.

Strangford, Percy Clinton Sydney Smythe, sixth Viscount (1780-1855), a British diplomatist, born in London and educated at Trinity College, 1802 became secretary of the Portuguese court after its removal to Brazil at the beginning of the Peninsular War. Later he was ambassador to Sweden, Turkey, and Russia. On his retirement in 1825 he was raised to the English peerage as Baron Penhurst.

Strangford, Percy Ellen Frederick William Smythe, eighth Viscount (1825-69), youngest son of the sixth viscount, born in St. Petersburg and educated at Harrow and Merton College, Oxford. He entered the diplomatic service and was Oriental secretary during the Crimean War. His attainments as a linguist and philologist were greater than his published works attest.

Strangles, see **HORSE, DISEASES OF**. The constriction of a blood vessel. The term is applied to the constriction of the indolent, as in bruising. In a case of death by S., all the evidences of asphyxia are present and the marks of the strangle are on the neck. The constriction is in which the

by the constriction of the sac. If not relieved by interference, the tumour swells and the bowel ultimately mortifies at the neck of the sac, with the result that the contents of the tumour are discharged into the abdominal cavity.

Stranorlar, a tn. of Donegal, Ireland, on the R. Finn, 23 m. S.W. of Londonderry. Pop. (1911) 3300.

Stranraer, a seaport and royal burgh of Wigtownshire, Scotland, on Loch Ryan, 6 m. N.E. of Portpatrick. Its chief building of interest is the old castle. It trades in dairy produce. Pop. (1911) 6432.

Straparola, Giovanni Francesco (d. c. 1557), an Italian writer, born at Caravaggio. He is chiefly remembered on account of his *Tredici piacevoli notti*, which is a series of stories in imitation of the *Decameron* (published 1550 and 1554). English translation by W. G. Waters (1894).

Strasburg, a tn. of Prussia, in the prov. of Brandenburg, 70 m. N. by E. of Berlin. Pop. 6382.

Strassburg, or Strasburg, the cap. of the prov. of Alsace-Lorraine, Germany, situated at the junction of the Ill and the Breusch, 2 m. W. of the Rhine. It is a fortress of the first class, the seat of a Roman Catholic bishop. The university, founded in 1567 and suppressed during 1790-1872, has about 2000 students. The most interesting buildings are the cathedral, dating from the 11th to 13th centuries, the Protestant Church of St. Thomas (13th century), and the House of the Provincial Assembly. The manufactures are numerous and varied, but S. is famed for its *pâtes de foie gras*. S. (Roman *Argentoratum*) was the scene of a victory of Julian over the Alemanni (357). It became a flourishing Imperial town, and numbered among its famous citizens Eckhart, Tauler, Gottfried von Strassburg, Sebastian Brant, and Thomas Murner. It was seized by France under Louis XIV. In 1681, but surrendered after siege to the Germans in 1870. It is the headquarters of a German army corps. Pop. 178,290.

Strata Florida (*Fetradflur*), the ruins of a Cistercian abbey in Cardiganshire, Wales, near the source of the Teifi. It was founded by Rhys ap Griffith, Prince of South Wales, in 1164, and suffered during the wars of Edward I. (1294). A western portal in the transitional Norman-English style (12th century) remains, and the foundations and some interesting tiles have been excavated.

Strategy and Tactics. By *strategy* is understood the art of planning out a campaign in war; the gaining of advantage over an enemy before any actual conflict takes place. By successful strategy, for example, an enemy may be forced to battle in a position or locality unfavourable to himself; he may be caused to divide his forces or to unite them at great disadvantage; he may be obliged to precipitate action, or submit to great

delay, when such is inconvenient. In fact, a general conceives a plan of campaign, in drawing up which he must consider the whole matter from his opponent's point of view, resources, etc., and such plan as arranged and further modified during the war constitutes the strategy. Success depends on a correct opinion as to the enemy's scheme, while arranging one's own plans in such a manner as may be unexpected by him. For such a purpose a thorough knowledge of the topography of the scene of war is of first importance, and both generals will consider from the first its *strategical points*. These are such that possession is vital to the scheme of campaign of the army holding them, the loss of any necessitating change in strategy involving greater risk. Besides topography, climate and season are factors of early importance. Beyond this, again, come all plans aimed at crippling the resources of the enemy, particularly in the matter of trade and commerce, though in such a matter a general is apt to find difficulty owing to restrictions or interference by his government due to possible international complications. In arranging his mode of invasion, the starting points, lines of attack, and objections, strategy in its more complete and military sense is paramount; the main attack may be masked and the enemy misled; by special combinations strategical points may be actually created. In offensive strategy, with the enemy on inner lines which he has had in all probability more time to strengthen, it is essential to prolong his uncertainty as to placing his main opposition as long as possible, and to lead him to change of idea and constant movement of forces, though defensive strategy by divining the true plan would consist in allowing the attack to waste energy in such a process. The Fabian policy against Hannibal is a classic example of defensive strategy, in which the plans of the attack were allowed to be carried out, only to lead to disaster. Wellington's strategical retreats in the Peninsular War were another example of leading attack to dissipate energy. One of Napoleon's great points of strategy was to lead opponents to attempt combination of forces and to anticipate them in time, defeating each in succession. Strategy, however, cannot be relied on to outweigh deficiency in numbers, or want of training, organisation, and equipment; it rather consists in the artistic use of these. *Tactics*, while consisting often of strategy in miniature or well-defined conditions, is the

term applied to the execution of plans, with variations as found immediately necessary, when actually in contact with the enemy. The lines of battle being drawn out, the operations until victory is won or defeat sustained are tactical, and again merge into strategy until actual conflict again arises. It is obvious that tactics is mainly a matter of the study of contact in its fullest sense. Whereas strategy has in many ways remained the same throughout history, tactics has been modified by the introduction of every new tool, arm, method of fortification, etc. Armies may come into contact at much greater range, and signalling and other methods of maintaining communications on the field of battle have become of increasing importance. Nevertheless, modern wars have shown that the old methods of the charge by cavalry or bayonet, the use of the sword or lance, cannot be neglected. Under the head of tactics must be considered the arrangement of the attacking army in marching before contact with the enemy, the disposition of forces in the field, the securing of controlling positions, entrenching, taking cover, the keeping of reserves, the order in which detachments enter into conflict, the setting in motion of large or small flanking movements. This last matter gives a very good example of the difference between the two subjects discussed; for flanking movements may form part of the tactics in an engagement, yet a similar movement on a large scale may be performed by a division of the army which may render a position untenable by the enemy, though the opponents have never come into contact at all. As an important tactical discovery may be mentioned the successful opposition to the charge of the armoured and mounted knights by the Flemish, in the middle ages; archers and pikemen were thus definitely employed against the English cavalry by the Scottish at the battle of Bannockburn, with disastrous results to the former, who, however, having learnt the lesson, employed it against the French in the Hundred Years' War with quite equal success. The introduction of gunpowder produced a much slower change in tactics, but of the same nature. The mere shock of charging bodies and the hand-to-hand conflict, decisive only when cavalry came into action, was retarded by the excellent archery of the middle ages, and still for over a century by archery and musketry together; yet even at the beginning of the 19th century there was no great change. A more

formation was adopted and ranks were only two or three deep: the musket and bayonet took the place of the musket and pike; the archers had disappeared, but everything was simply a preliminary to hand-to-hand fighting. Volleys were fired to mask by their smoke an advance to charging distance, another volley was fired, and the forces engaged at close quarters. The introduction of the rifle and its perfected bullet made precision in aim surer and range greater; artillery has served the same end, and machine guns have further made a more open formation necessary. The rapid and sure means of communication and means of transport have kept pace with these changes, so that a battle front may now extend over many miles. At the same time strategy must be open to greater complications and more rapid decisions, fault entailing greater danger. Modern tactical operations

and if they are to be successfully carried out the training and organisation in peacetime must be thorough and sound.

Stratfieldsaye, or Strathfieldsaye, an estate in Hampshire, England, 7 m. N.N.E. of Basingstoke; given in 1817 by Parliament to the Duke of Wellington.

Stratford, a suburb of London and registration dist. of West Ham bor., Essex, England, 4 m. E.N.E. of St. Paul's, on the Great Eastern Railway. It has chemical works, manufs. of candles, varnish, and paint, and a waydepot. Adjoining sea is Stratford-le-Spa, 50,740.

Stratford: 1. The cap. and port of entry of Perth co., Ontario, Canada, on the Avon and the Grand Trunk Railway, midway between Sarnia Tunnel and Toronto. It has chemical works, breweries, and railway shops. Manufs. include hosiery, woollens, furniture, iron, and biscuits. Pop. 15,000. 2. A post tn. of Stratford co., North Is., New Zealand, 25 m. S.E. of New Plymouth. Pop. 2200. 3. A tn. of Fairfield co., Connecticut, U.S.A., 5 m. N.E. of Bridgeport. Pop. (1910) 5712.

Stratford - a town in Stratford Cannings, English diocese.

Through the good offices of his cousin, George Canning, he became secretary of the embassy at Constantinople in 1808, and minister plenipotentiary in 1810. He exercised great skill in negotiating the Treaty of Bucharest and Turkey in 1812. His service at Switzerland became minister to

the U.S.A. in 1820, where he was successful in the settlement of the international questions arising out of the war of 1812. He was at Constantinople again in 1841 as ambassador, and remained there throughout the Crimean War, largely influencing the political reforms and foreign relations of Turkey and earning for himself the title of 'The Great Elchi' (great ambassador). His papers, etc., were published, with preface by A. P. Stanley, under the title of *The Eastern Question*.

Stratford-on-Avon, a market tn. and municipal bor. of Warwickshire, England, 22 m. S.S.E. of Birmingham. It is pleasantly situated in the wooded valley of the Avon. The river is crossed by a fine bridge, erected in 1496 by Sir Hugh Clopton, Lord Mayor of London. The town is famous as the birthplace of Shakespeare. Here may be seen Shakespeare's house in Henley Street, and his birth-room, on the walls of which can be found the signatures of Scott, Dickens, Thackeray, and other distinguished visitors; Anne Hathaway's cottage in Shottery; the graves of the poet and his wife in the chancel of Holy Trinity; the site of 'New Place,' Shakespeare's house in later life; King Edward VI.'s grammar school, and the red brick Shakespeare Memorial Theatre (1877-79), whose performances of his plays are given annually. Stratford is a place of great antiquity. The chapel of the Guild of the Holy Cross dates from the 13th century, and Holy Trinity occupies the site of a Saxon monastery. Consult the works of Halliwell-Phillips and Sir Sidney Lee, and Wheeler's *History and Antiquities of Stratford-on-Avon*, 1806; W. S. Braddington's *Shakespeare's Homeland* (new ed. 1913); H. W. Tompkins' *Stratford-on-Avon* (Temple Topographies Series).

Strath (valley), a par. of Skye, Inverness-shire, Scotland, including Pabbay and Scalpay Is. Pop. (1911) 2500. Any long, wide valley is so called in Scotland. Strathspey has the R. Spey running through it.

Strathalbyn, a municipal township and tourist resort of Hindmarsh co., S. Australia, 28 m. S.E. of Adelaide. Gold, silver, and copper are mined. Pop. 1200.

Strathaven (Strathavon), a market tn. of S. Lanarkshire, Scotland, near Avon Water, 14 m. S.E. of Glasgow. It has a ruined 15th century castle. Manufs. include hosiery, cotton, and silk. Cattle and cheese are also produced. Pop. (1911) 4100.

Strathelydo, an ancient British (Welsh) kingdom while during the 7th-10th centuries occupied the basin of the Clyde and the neighbouring

maritime districts. As it is sometimes called Cumbria, it is probable that at one time it extended into what is now called Cumberland. Its capital was Alelyde (Dumbarton). See W. F. Skene, *Celtic Scotland*, 1876.

Stratheona, a tn. of Alberta, Canada, situated opposite Edmonton on the Saskatchewan R. It is now incorporated in Edmonton.

Stratheona and Mount Royal, Donald Alexander Smith, Lord (b. 1820), was High Commissioner for Canada from 1896 to 1911; educated in Scotland. Entered Hudson Bay Company's service, and was the last resident governor; special commissioner during Riel rebellion in Red River settlements; member of the first Executive Council of N.W. Territory; represented Winnipeg and St. John's in Manitoba legislature, 1871-84; M.P. for Selkirk in Dominion House of Commons, 1871-72, 1874, and 1878; Montreal West, 1877-96; director of St. Paul, Minneapolis, and Manitoba Railway, and of Canadian Pacific Railway Co.; hon. president Bank of Montreal; D.C.L., Oxford and Dublin; hon. LL.D. of Cambridge, Aberdeen, Glasgow, Victoria (Manchester), Dublin, Queenstown, Laval, Yalo, Ottawa, and Toronto universities; chancellor of McGill and Aberdeen universities; lord rector of Aberdeen, 1899, and chancellor, 1903. At his own expence he raised a troop of 600 men (Stratheona's Horse) who served gallantly in the Boer war (1899-1902). Created K.C.M.G., 1886.

Strathmiglo, a vil. of Fife, Scotland, chiefly engaged in the manuf. of linen. Pop. (1911) 1724.

Strathmore, a wide valley of Scotland, bounded on the N. by the Grampians, and on the S. by the Lennox, Ochil, and Sidlaw Hills.

Strathnairn, Hugh Henry Rose, Baron (1801-85), a British soldier, born at Berlin, and entered the English army in 1820. In the war against Mehmet Ali in 1840 he was attached to the Turkish army; was made consul-general of Syria, and chargé d'affaires at Constantinople from 1853 to 1854. In 1857 he was sent to command the Central Indian Army in India, and rendered exceptionally good service during the Mutiny, his operations excelling Sir Colin Campbell's in skill. He became commander-in-chief of the Indian Army on the death of Lord Clyde, and from 1865 to 1870 was commander-in-chief in Ireland. He was made a peer in 1866, and field marshal in 1877.

Strathpeffer, a vil. and health resort of Ross and Cromarty, Scotland, 44 m. W. of Dingwall. It has mineral springs. Pop. (1911) 360.

Strathspey, a Highland dance de-

rived from the 'reel,' and originally associated with the Spcy Valley ('strath'), where it became popular in the late 18th century.

Stratigo, Simone, Count de la, 1720

of several works on hydraulics and navigation, and wrote a *Marine Vocabulary*. Filled the chair of navigation and mathematics at Padua.

Stratiotes, a monotypic genus of Hydrocharidaceae, and its only species is *S. aloides*, the water-soldier. In appearance it resembles a small aloe, and its dwelling is in rivers of Siberia and Europe, including Britain.

Strato, or Straton (Gk. Στράτων), a Greek Peripatetic philosopher of

Laert. v.

Stratton, a par. and market tn. of Launceston div., N.W. Cornwall, England, 1½ m. from Bude, a favourite summer resort. Pop. (1911) 2980.

Stratum, a layer or bed of sedimentary rock, formed by the consolidation of sediment laid down on the sea floor or lake bottom. The rocks which are arranged in strata are designated aqueous or stratified. See GEOLOGY.

Stratus, see CLOUD.

Straubing, a tn. of Bavaria, on the Danube, 25 m. S.E. of Ratisbon. It has some interesting old buildings, including a 13th century tower, while its chief industries are brewing and tanning, and the manuf. of bricks, cement, and lime. Pop. 22,024.

Strausberg, a tn. in Brandenburg, Prussia, 20 m. E.N.E. of Berlin, engaged in textile manuf. Pop. 8233.

Strauss, David Friedrich (1808-74), a theologian, born at Ludwigshurg, Würtemberg; studied under Baur (Tübingen) and Schleiermacher (Berlin); read Schelling, Böhme, and other mystics and idealists. Turning to Hegelianism, he rapidly developed it with a radical tendency to atheism. He became lecturer in philosophy at Tübingen in 1832; in 1835 appeared his *Life of Jesus*, in which he assumed a rationalistic attitude, regarding Christianity as a commonplace pseudo-mythological religion and Christ as a sort of Jewish Socrates. A storm of controversy arose, and certain modifications were made in the 1839 edition. But that year he was forced to resign his new appointment at Zürich (chair of his bitter indignation over the 1840 edition, in which cast adrift from Christianity. (Eng. escape. From it and from the Chilli S.

trans., George Eliot, 1846.) In 1841 he published *Christliche Glaubenslehre*. Other works: *Reimarus*, 1862; *Voltaire*, 1870; *The Old and New Faith*, 1873. *Works*, ed. Zeller, 12 vols., 1876-78; *Lives* by Zeller, 1874; Eck, 1899; and Ziegler, 1908-9.

Strauss, Johann (1804-49), a Viennese composer, famous for dances; toured Germany, the Netherlands, France, and England with his orchestra; composed about 150 waltzes and a large number of galops, quadrilles, etc.

Strauss, Ludwig (1835-99), a violinist, distinguished for his sound artistry, born at Pressburg; studied at Vienna Conservatoire under Böhm, Preyer, and Nottobolm; in 1856 met Liszt, whose friendly interest he aroused; toured Italy, Germany, and Sweden (1855-57), and England (1860), where, after a brilliant career as virtuoso and music director at Frankfurt, he settled (1864); led the Halle Orchestra (1864-88).

Strauss, Richard (b. 1864), a composer, born at Munich, pupil of F. W. Meyer; succeeded Bulow at Munich in 1885; toured Europe, 1896-98; court-conductor at Berlin since 1898. One of the greatest living composers who has developed Wagner's traditions; he has written several operas, e.g. *Feuersnot*, *Elektra*, *Salomé*, *Rosenkavalier*, and *Ariadne in Naxos*. His instrumental compositions, chiefly symphonic or tone poems, are the finest of their kind ever written—*Don Juan*, *Tod und Verklärung*, *Till Eulenspiegel*, *Zarathustra*, *Heldenleben*, and *Don Quixote*.

Straw, the stalk or stem of various corn crops such as wheat, barley, oats, rye, maize, leguminous crops, and also flax and hemp. In the newer countries of the world it is regarded as of little or no value, and is often

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species and variety, and considerable attention has been paid in recent years to the production of varieties which by the strength or firmness of their straw do not 'lodge' or become 'laid,' though this is commonly due to lack of sufficient light, to overcrowding, and to excess of nitrogenous manures.

Strawberry, the fruit, or more correctly, an achenium of achenes of various species of the genus *Fragaria* (order Rosaceae). The fruit of the wood S. (*F. vesca*), the only British

small but very delicately The Hautboy S. somewhat wild, but is a garden escape. From it and from the Chilli S.

(*F. chilensis*) and scarlet S. (*F. virginiana*) the cultivated varieties are mostly derived. Ss. do best on a deeply worked loam enriched with decayed manure. The plants are set out in late summer or early autumn 18 in. apart, in rows 30 in. apart. When the bloom appears, long clean straw must be spread between the rows, partly as a protection against late frosts, but chiefly to keep the fruit clean. In September the ground should be thoroughly cleared, runners removed, and the soil well stirred and dressed with ash from the garden refuse fire. In February or March well decayed manure should be applied, and dressings of liquid manure, while fruit is being produced, are desirable. S. plants are propagated by allowing runners to root in small pots containing light loamy soil.

Strawberry Hill, see TWICKENHAM.

Strawboard, see CARDBOARD.

Streatham, a suburb of S. London, in the Wandsworth metropolitan bor., Surrey, England, 6 m. from St. Paul's, on various railways. There is a fine common of 60 acres. S. contains the British Home for Incurables (1894) and a Magdalen hospital. The site of Thrale Place, where Johnson used to visit, is in S. Park. Pop. (district) 132,165.

Streator, a city of Illinois, U.S.A., in LaSalle co., on Vermillion R., 50 m. N.E. of Peoria. It is a railway centre, and has important manufactures and coal mines. Pop. (1910) 14,253.

Street, a tn. of Somersetshire, England, near to Glastonbury. Chief manuf. shoes. Pop. (1911) 4235.

Street, George Edmund (1824-1881), an architect who was responsible for the new Law Courts built in the Strand at the close of the eighteenth century. S. only secured the commission after a great deal of rivalry and discussion. Much of his work was done in connection with churches, notably at York, Ripon, and Bristol. S. was a follower of the Gothic tradition. He wrote *Gothic Architecture in Spain*, and a new edition of this book was published in 1913 edited by G. G. King.

Strelitzia, a genus of Musaceae which occurs exclusively in Africa, and contains only five species. *S. reginae* is known as the queen's-flower, bird's-tongue flower, or bird-of-Paradise flower, because of its showy orange and blue colours.

Streitsi, or Stryeltsy, see RUSSIA—History.

Strength of Materials. Substances used for building purposes, such as wood, metal, etc., have a certain limit of resistance and yielding to stresses and strains of various kinds. The study of this limit falls under

the above head. The amount of stress and strain that a substance will withstand before it breaks can only be determined by elaborate experiments on that substance with specially designed apparatus. Before making a structure it is necessary to know the kind and amount of stress to be laid on it. This known, the engineer must use material of sufficient strength and of suitable size and shape to resist this stress. There are four strains which a material may undergo, namely: (1) extension; (2) bending; (3) twisting; (4) compression. Whatever combination of these strains there may be, there are really only three resistances called into play, namely: (1) the tenacity of the substance, i.e., the resistance to extension; (2) the resistance to shearing strain (see ELASTICITY); and (3) the resistance to compression or crushing. For many substances (1) and (3) are the same, but for others, notably cast iron, the resistance to crushing is much greater than the tenacity. For engineering purposes the different strengths are classified under the following heads: (1) tenacity; (2) resistance to bending; (3) resistance to twist; and (4) resistance to thrust, i.e., resistance to a pressure applied at both ends. This is really a combination of a resistance to bending and a resistance to compression. See Todhunter and Pearson, *History of Elasticity and Strength of Materials*, etc.

Strepsiptera, an order which consists of tiny insects living in parasitic fashion inside the bodies of bees and other hymenopterous insects. There is only one family, the Stylopidae.

Streptocarpus, a genus of Gesneriaceae, found in Africa. It contains thirty species, usually known as Cape primroses, which are downy herbs bearing beautiful flowers generally of a purple or blue colour.

Streptococci, see BACTERIA.

Stretchers, see BRICKWORK.

Stretford, a tn. of Lancashire, England, 3½ m. S.W. of Manchester. Pop. (1911) 42,496.

Stretto, see FUGUE.

Stretton, Hesba, the nom-de-plume of Sarah Smith, an English novelist. Her most famous work is *Jessica's First Prayer* (1867), published by the Religious Tract Society. She also contributed stories to *Household Words* and *All the Year Round*, and wrote numerous moral tales for the young.

Strickland, Agnes (1796-1874), an English historian, born near Southwold, Suffolk. She wrote in 1833, *Historical Tales of Illustrious British Children*, and also for the young, *Tales and Stories from History* (1836). Her

best-known and more famous work, written in collaboration with her sister, Elizabeth, is the *Lives of the Queens of England* (1840-48). This was followed (1850-59) by *Lives of the Queens of Scotland and English Princesses*.

Stricture, the narrowing of a canal in the body by inflammatory or other changes in its walls. The term is most commonly used of urethral S., caused by ulceration due to gonorrhoeal infection. The S. should be kept open by occasionally passing a bougie into the channel. S. of the oesophagus can be treated by dilatation with a bougie unless it is due to malignant ulceration, when food must be administered *per rectum* or directly into the stomach. Malignant S. of the intestines is met by short-circuiting or by cutting out the affected portion.

Striegau, a tn. in Sillesia, Prussia, 33 m. W.S.W. of Breslau. The chief manufs. are leather, machinery, cigars, and brushes. Pop. 14,574.

Strigidæ, see OWLS.

Strike, of strata, is the direction of a line drawn at right angles to the true dip or inclination of the beds. The S. coincides with the outcrop when the surface of the ground is level and when the beds are vertical. It may be a straight line or may curve in every direction according to the behaviour of the dip, and thus in a basin-shaped bed the S. will be a complete circle. Faults may produce sudden changes in the S.

Strikes, see TRADE UNIONS.

Strindberg, Johan August (1849-1912), a novelist and dramatist, born in Stockholm, educated at Upsala University; originally forced by poverty to teaching and journalism, and engaged in the Stockholm Royal Library from 1874-80. His work, consisting of fifty-five plays, thirteen volumes of short stories, seven novels, and forty other volumes, is mostly imbued with the deepest pessimism and bitterness. Typical of his pungent realism is the *Red Room* (1879), a first-period book wherein is first brought forward his characteristic hatred of women, despite which he has thrice married. His anti-feminism has caused much controversy with the Ibsenites. A fanatical egotist, he has written many pseudo-autobiographies, e.g. *The Son of a Servant* (literally, *The Bondswoman's Son*) (1886), and *The Confessions of a Fool* (1893). His later tendencies are religio-mystical, e.g. *Towards Damascus* (1898). There is little doubt of S.'s insanity. Translations in English have been issued of *t* above, and of *In Midsummer Day* (prose), *Easter*, *Miss Julia*, *I*

Father (his masterpiece), *Inferno*, *Pariah*, and other plays. S. was one of the first to appreciate Nietzsche. See Miss Lind-af-Hageby's *August Strindberg* (1913).

String Course, in architecture and building, a projecting course of masonry or bricks which forms a string or horizontal line on the face of the wall. In Gothic architecture such S. Cs. usually consist of a series of mouldings.

Stringhalt, or **Clicking**, a sudden spasmodic twitching of the muscle of one or both hind legs of a horse. An animal so affected is classed as unsound, though it can carry heavy loads forwards, but has difficulty in backing.

Stroma, an island in Pentland Firth, 3½ m. N. of Orkney. Pop. (1911) 375.

Strophopoda, of gastropod type, known from the Silurian.

Stromboli, a volcanic island of the Lipari group, situated N. of Sicily. The chief genera are *Strombus* and *Pterocarpus*.

Stromboli, a volcanic island of the Lipari group, situated N. of Sicily. The active volcano has a height of 3040 ft.

Stromness, a seaport tn. in Pomona, Orkney Is., 13 m. W. by S. of Kirkwall. The chief industry is fishing. Pop. (1911) 1656.

Strömstad, a seaport tn. in the län of Göteborg, Sweden, on the Skager Rack. It exports granite. Pop. (1911) 2978.

Strontium (Sr, 87.6), a metal of the alkaline earths, which occurs in nature as strontianite (SrCO₃) and celestine (SrSO₄). The metal is obtained by the electrolysis of the fused chloride and is white in colour. It readily oxidises in air and decomposes in water at ordinary temperatures (melting point 800°, sp. gr. 2.5). Heated in hydrogen it forms a hydride (SrH₂) which when heated in vacuo yields pure S. Two oxides of S. are known, the monoxide and the dioxide. The monoxide, strontia, hydroxide, sulphate, carbonate, and phosphate, the salts of S. are soluble in water. They impart a crimson colour to the flame, and are therefore used in pyrotechny. The hydroxide is largely used in the manufacture of beet sugar.

Strood, a tn. of Kent, England, on the Great O. R. R. Pop. (1911) 1,000.

Strophos, cord; us of Apocynaceæ.

the species of which are found from South Africa to China. There are over twenty of these, and they consist of small trees or shrubs bearing peculiar flowers which have long and thread-like lobes on their petals. *S. hispidus* yields the inée poison.

Strophe (Gk. *στροφή*, a turning), a term used in versification to denote a collection of prosodical periods, combined into a structural unit.

Strophulus, an eruptive affection occurring in infants, characterised by small red papules and caused by digestive troubles. It is popularly known as 'red gum' or 'tooth-rash.'

Strossmayer, Josef Georg (1815-1905), an Austrian Roman Catholic bishop, born at Essek, and educated at Budapest and Vienna. Ordained in 1838, he was shortly afterwards appointed professor at the Diakovar Seminary, and consecrated bi-hop of Bosnia and Sirmio. In the Vatican Council he was the leader of those who opposed the dogma of papal infallibility. He wrote *Monumenta Slavorum Meridionalium*.

Stroud: 1. A market tn. of Gloucestershire, England, on the Stroudwater Canal, 8½ m. S. by E. of Gloucester. For many centuries broadcloth and scarlet-dyed cloth have been manufactured in the neighbourhood. S. also has manufactures of plns, carpets, and umbrellas. There are also breweries, silk mills, dye-works, and iron foundries. Pop. (1911) 8772. 2. A tn. of New South Wales, in Gloucester co., 32 m. N. by E. of Raymond Terrace. There is a gold-field in the neighbourhood. Pop. (district) about 4000.

Stroud Green, a northern suburb of London, in Middlesex, England, 5 m. N. by W. of St. Paul's.

Structural Steelwork is commonly understood to mean steelwork applied to buildings and to engineering structures other than bridges. The adoption of steel for such uses was preceded by the application of wrought iron in the same way, the earliest example of which was given by Wm. Handyside, who about 1840 built up wrought-iron beams for buildings in St. Petersburg. In this country S. S. was first applied to roofs, later to beams and stanchions. Rolled iron beams, largely used in floors, were introduced as 'double tees' in 1853, and later were made of steel. S. S. was primarily used in buildings for members previously made of timber or cast iron, but in 'steel framed' buildings, first constructed in America, the steelwork itself carries the walls, which, being weather screens simply, are thin, thus in tall buildings economising floor space. 'Sky-scrapers' of twenty floors or more are common in the

U.S.A., but the building laws of Great Britain do not permit such constructions. The work of design was first systematised in America, where the practice was introduced of assuming the total live loads carried by stanchions and foundations to be less than the sum of all the live loads which each floor was required individually to carry on occasion. To facilitate computations tables were also prepared of the bearing capacities of rolled and built-up beams, and stanchions of various sections. Drawing-office work was also economised and manufacture cheapened by the use of standard details and connections. The unit stresses observed in this country are commonly limited to 7½ tons per sq. in. on beams, and 6 tons on compression for short stanchions, with a sliding scale reduction as the ratio of length to section stiffness increases. The foundations under stanchions are sometimes complicated arrangements of joists, or 'grilles,' used to spread weight—in special cases where the property limits require it, stanchions are supported on the projecting ends of cantilever beams properly secured for stability. In all tall and narrow buildings wind effects have to be provided for by diagonal bracing or by stiffening knees between floor girders and uprights. Steelwork alone, though incombustible, cannot be considered immune from fire, for which reason it is good practice to encase it in concrete, terra-cotta, or other fire-resisting material. The cost of steelwork in a framed building may be about 2d. per cubic ft. of contents, while the cost of design varies from 2s. 6d. to as much as £1 per ton of steelwork. Roofs of large span are always constructed of S. S. It is applied also to such varied uses as tanks, reservoirs, bins, lighthouses, gantries, dock-gates, caissons, etc. In recent years reinforced-concrete has proved a very serious rival to S. S. See Freitag, *Architectural Engineering*; H. Fidler, *Construction in Mild Steel*; Farnsworth, *Constructional Steelwork*.

Struensee, Johann Friedrich, Count (1737-72), a celebrated political adventurer, was the son of a clergyman at Halle in Saxony. He studied medicine, taking his degree of Doctor in 1757. In 1768 was appointed physician to the king of Denmark, whom he accompanied on his tour to Germany, France, and England. Soon after the marriage of Christian VII. with Princess Matilda of England, a coolness was observed between the king and queen. The queen, observing the influence of S. over the king, sought by his means to effect a reconciliation with her husband and suc-

ceeded. S. was later convicted of treason, and sentenced to lose his right hand, to be beheaded, and quartered.

Struma, another term for scrofula (q.v.).

Struma (Turkish *Kara-Su*), a riv. of Bulgaria and Macedonia, rising in the former country and flowing into the Gulf of Rentina.

Strut, in framed structures, any pillar or beam that supports a weight or lateral thrust.

Struthers, Sir John (1823-99), a Scottish anatomist, born at Brucefield, Dunfermline. After qualifying in Edinburgh, he became assistant surgeon to the Royal Infirmary of that city (1854), and afterwards professor of anatomy at Aberdeen (1863-89). He was also president of the Royal College of Surgeons, Edinburgh (1895-97).

Strutt, John William, see RAYLEIGH, JOHN WILLIAM STRUTT, THIRD BARON.

Strutt, Joseph (1749-1802), an English artist and antiquary, born at Springfield, Essex. Apprenticed to the engraver Ryland. Published his first work, *Regal and Ecclesiastical Antiquities of England*, in 1773, containing representations of the English monarchs from Edward the Confessor to Henry VIII. This was followed by *Biographical Dictionary of Engravers; Complete View of the Dresses and Habits of the People of England; Ancient Times; Sports and Pastimes*, etc. See ed. by J. C. Cox, 1904.

Struve, Friedrich, Georg Wilhelm (1793-1864), a German astronomer, born at Altona and educated at Dorpat University, where he was appointed director of the Observatory (1817). In 1839 he was transferred to the new observatory of Pultowa, where he remained till 1861. He was specially occupied with researches on double stars, of which he published his observations in 1827, 1837, and 1852.

Struve, Otto Wilhelm (1819-1905), a German astronomer, son of F. G. W. Struve, born at Dorpat. He became his father's chief assistant at Pulkowa, and in 1862 was appointed director of that observatory. He was also chairman of the International Astronomical Congress (1867-78) and president of the International Congress for a Photographic Survey of the Stars.

Stry, or Stryj, a tn. of Galicia, Austria, 41 m. S.W. of Lemberg. Chief industries are tanning and the manufacture of matches. Pop. 30,203.

Stryehnine ($C_{17}H_{23}N_2O_2$), an alkaloid occurring in *Strychnos nuxvomica*, *S. colubrina*, *S. ignatii*, *S. icafa*, and other trees of the same genus. The alkaloid is contained with brucine in the bark, leaves, seeds, and root. S.

is a crystalline solid, insoluble in water, but soluble in alcohol and chloroform. It has an alkaline reaction and a bitter taste; optically it is laevorotatory. The alkaloid and its salts are used in medicine as tonics and stimulants. It is especially employed in collapse from alcoholism, pneumonia, emphysema, etc., the dose being under $\frac{1}{2}$ grain. In larger doses it acts as a powerful poison, one grain being a fatal dose in many instances. The symptoms of poisoning commence with a stiff neck, and shortly the patient is seized with tetanic convulsions, the muscles being contracted for a minute at a time; often the body is thrown into the form of an arch, the patient resting on his head and heels. The treatment must commence with emptying the stomach with an emetic or the stomach-pump. Chloral and potassium bromide have been found useful in counteracting the spasms.

Strychnos Nux Vomica, an Indian tree of the order Loganiaceae. It contains several alkaloids, the chief of which are strychnine and brucine.

Stryl, a riv. of Austria, rising in the Carpathians and flowing into the Dniester.

Strype, John (1643-1737), an English ecclesiastical historian and biographer, born at Houndsditch, London, was the author of *Memorials of Thomas Cranmer* (pub. 1848-54), *Life of the Learned Sir John Cheke* (1705), *Annals of the Reformation in England* (4 vols., 1709-31), etc. He obtained the curacies of Theydon Bois and Leyton, in Essex (1669), the sinecure of W. Tarring, Sussex (1711), and a lectureship at Haekney (1689-1724).

Stuart (or Stewart), Charles Edward Louis Philip Casimir (1720-88), known as the 'Young Pretender,' being the elder son of the Chevalier de St. George, the 'Old Pretender,' born in Rome. He served in the wars of the Polish and Austrian Succession, distinguishing himself when very young at Geta (1734) and Dettingen (1743). In 1743 he headed an unsuccessful French invasion of England, but in 1745 succeeded in landing at Eriska in the Hebrides. Marching southwards, he entered Edinburgh and held his court at Holyrood. He defeated Cope at Prestoapans. With a troop of 6500 men he invaded England, and marched as far S. as Derby, when prudence urged him to retreat to Scotland. There he was again victorious at Falkirk (1746), but was overwhelmed by Cumberland at Culloden, and for many months hid in the fastnesses of the Highlands with £30,000 on his head. Before the end of the year he escaped to France, whence he was expelled in 1748. He

is supposed to have visited England on secret conspiracies in 1750, 1752, and 1754, and spent the remainder of his life as a fugitive on the continent. See *Lives* by Ewald (1875), Lang (1900), and Norie (1903-4).

Stuart, Arabella, or Arbella (1575-1615), the only child of Charles S., Duke of Lennox, younger brother of Henry, Lord Darnley, the father of James I. James and she, therefore, were full cousins. She was, before the birth of his son Henry, in Feb. 1591, the next in order of succession to the English throne to James. She first became an object of general attention by the manner in which her name was brought forward after the accession of James, in the affair of the alleged plot called 'the Malin,' for which Sir Walter Raleigh was tried. One of the charges against Raleigh was that he designed to raise the Lady Arabella to the throne, under the protection of Spain. There is no probability, however, that any such design ever was entertained. Her situation, however, was a difficult and dangerous one. She was secretly married to William Seymour, second son of Lord Beauchamp, the eldest son of the Earl of Hertford; but it was discovered in 1610, and Seymour and the lady placed in separate confinement. Arabella escaped from Highgate and Seymour escaped from the Tower. Seymour reached Flanders in safety, but Arabella was captured in Calais Roads and placed in the Tower, where she died insane.

Stuart, Gilbert Charles (1755-1828), an American artist, born at N. Kingstown, Rhode Is., and studied in England under Benjamin West. After living in Ireland (1788-92), he returned to America, where he met with great success. His chief portraits are of Washington, John Adams, Jefferson, Winthrop, Sir Joshua Reynolds, and Horace Blynny. See *Life* by G. C. Mason, 1879.

Stuart (or Stewart), Henry Benedict Maria Clement, Cardinal York (1725-1807), called by Jacobites Henry IX., was the second son of the Chevalier de St. George, the 'Old Pretender.' He took part in the rising of 1745, and on his return to Italy became Bishop of Ostia and cardinal (1747), Archbishop of Corinth (1759), and Bishop of Tusculum (1761). See Thornton's *The Stuart Dynasty*, 1891.

Stuart (or Stewart), James, see MORAY.

Stuart, James (1713-88), an English painter and architect, distinguished by the name of 'Athenian Stuart.' He originally painted on fans for Lewis Goupy, the painter. In 1751 he travelled with Nicholas Revett in

Greece, and afterwards published *Antiquities of Athens* (1762), which awakened a keen interest in Greek architecture. S. built Lord Anson's house in St. James's Square in the Athenian style, which through him had a great vogue in London.

Stuart, James Francis Edward (1688-1766), Prince of Wales, commonly styled the 'Chevalier de St. George,' and later known as 'The Old Pretender,' was the son of James II. by his second wife, Mary of Modena. The prince was born in June, and in December, when the king had fled to fly the country after the death of the Prince of Orange, was taken to France. In 1701 James II. died, and his son was accepted by the Jacobites as King of England under the style of James III. He served with distinction in the French army before the Peace of Utrecht, and in 1715 went to Scotland to take part in the unsuccessful Jacobite rising. He married Maria Clementina Sobieski in 1719, but his conduct as a husband alienated many of his followers. He provided money for the rising of '45, but his interest in the attempt to secure his restoration was languid.

Stuart, John, see BUTE, third EARL OF.

Stuart, John (1813-77), a Scottish antiquary and advocate, was educated at Aberdeen University. He was attached to the Register House, Edinburgh (1853-77), became secretary to the 'Spalding Club' (1839-70), and wrote *Sculptured Stones of Scotland*, 1856 and 1867; *The Book of Deer*, 1869, etc.

Stuart, Moses (1780-1852), an American biblical scholar, born in Wilton, Connecticut, and educated at Yale, where he became tutor. He was appointed pastor to the Centre (Congregational) Church of New Haven (1806), professor of sacred literature at Andover (1810-48). He published a *Hebrew Grammar*, 1813; *Letter to Dr. Lanning on the Subject of Religious Liberty*, 1830; *Hebrew Chrestomathy*, 1829-30, etc.

Stuart-Wortley-Mackenzie, James Archibald, see WHARNCIFFE, BARN.

Stubbs, Charles William (1845-1912), Bishop of Truro and expositor of the modern Christian social movement. Author of *Christ and Democracy*, 1884; *Christ and Economics*, 1893; *Christ and Liberty*, 1883; *A Creed for Christian Socialists*, 1897; *The Social Creed of a Christian Democrat*, 1894, etc. Bishop Stubbs was a Christian social reformer of a moderate type.

Stubbs, George (1724-1826), born at Liverpool and settled in London as a painter of animals. He completed in 1766 his work *On the Anatomy of the*

Horse, in eighteen tables; and before his death three numbers of another work under the title of *A Comparative Anatomical Exposition of the Structure of the Human Body with that of a Tiger and a Common Fowl*, in thirty tables. Many of his productions have been engraved. His 'Spanish Pointer,' engraved by Woollett, is a fine specimen.

Stubbs, John (1543-1591), an Elizabethan pamphleteer, was educated at Corpus Christi College, Cambridge. When the Duke of Anjou became a suitor for the hand of Queen Elizabeth, S. published a pamphlet against the marriage, for which he was condemned to lose his right hand.

Stubbs (or Stubbes), Philip (c. 1555-c. 1610), the author of several very curious works written with a touch of the conceit of the Euphuists of the 16th century. *The Anatomie of Abuses* is his best-known work. He also wrote a life of his wife called *A Christal Glass for Christian Women*.

Stubbs, William (1825-1901), an English historian and prelate, born at Knaresborough, and educated at Ripon Grammar School and Oxford. From 1850 to 1866 he held the living of Navestock, Essex, and was then appointed professor of modern history at Oxford. In 1884 he was consecrated bishop of Chester, and five years later translated to the see of Oxford. Chief work, *Constitutional History of England*. Also published, *Lectures on Mediæval and Modern History*, *Registrum sacrum anglicanum*, etc. See *Letters* (ed. by W. H. Hutton), 1904.

Stucco, an Italian word applied in most languages to plaster of any kind used as a coating for walls to give them a finished appearance. Stucco-work or *stuccatura* is interior ornament in imitation of carved stone.

Stud-Book (A.-S. *stod*, a breeding mare), a register showing the genealogy of particular breeds of animals, such as cattle and horses, but mainly of horses; also a book of degree of horses of horse-racing.

Studley, a par. of Stratford-on-Avon dist., Warwickshire, England, 13 m. W. of Warwick. Bodkins, needles, and fish-hooks are manufactured. Pop. (1911) 2600.

Stuerbout, Dieerck, a Dutch painter established at Louvain about the middle of the 15th century. In 1468 he executed two striking paintings with life-size figures illustrating 'The Golden Legend,' now in the Brussels Gallery. In 1472 he painted a large altar-piece of 'The Last Judgment,' and other works have been assigned to him, about which there is a good deal of uncertainty.

Stuffing, see TAXIDERMY.

Stuhlweissenburg, a tn. in the co. of Stuhlweissenburg, Hungary, 35 m. S.W. of Budapest. It was originally the coronation place of the kings of Hungary, and is an episcopal see. Chief manufs. are knives and woollen goods. Pop. 33,000.

Stukeley, William (1687-1765), an English antiquary, practised as a doctor in Boston (Lincolnshire), London, and Grantham, and after 1729 was successively vicar in Stamford, Somerby, and Queen Square, London. He pub. *Stonehenge* (1740) and *Abury* (1743). See *Family Memoirs of Stukeley*, 1882.

Sturdy, or Gid, a disease of young sheep (q.v.).

Sture, Sten, the name of two regents of Sweden: *Sten Sture, the Elder* (1440-1503), raised levies from the peasants and twice defeated Christian I. of Denmark, the second time (1471) at the battle of Brunkebjerg. Although he was obliged to acknowledge the suzerainty of Hans, King of Denmark and Norway (1483), and impaired his country's strength with a Russian war, he was a great statesman and encouraged learning by founding the University of Upsala. *Sten Sture* (1492-1520) was the son of Svante Sture (q.v.). His brief but stormy rule was absorbed with the humiliation of his rival, Archbishop Trolle, whom he humiliated in a monastery after capturing his stronghold of Ståke (1516), and, further, with three great battles against Christian II. of Denmark; at Vedla and at Bränkyrka (1518) he was victorious, but during the third, fought near Bürgerund, he received a mortal wound.

Sture, Svante (d. 1512), regent of Sweden, succeeded his uncle in this office. In early years he assisted King Hans, and latterly he opposed Danish aggressions.

Sturgeon, William (1783-1850), an English electrician, born of humble parentage and served as a private in the Royal Artillery. At his death he was lecturing on science at the Royal Victoria Gallery, Manchester. His inventions were practical applications of the theories of Oersted, Faraday, and Ampère, and included an electro-magnetic machine made of soft iron (1825), and an acid bath for plates of rolled zinc in galvanic batteries.

Sturgeon Bay, a vil. with a good harbour and canal connection with Lake Michigan, on the E. of Sturgeon Bay, in Door county, Wisconsin, U.S.A. There are lumber mills. Pop. (1910) 4262.

Sturgeons, the fishes which constitute the family Acipenseridae in the order Chondrostel. They are large

and have elongated bodies, bearing five rows of large bony scutes; the mouth is small, has no teeth, and in front of it are four barbels. S. are voracious feeders on small animals and plants, they are themselves eaten by man; eaviare is made from the ovaries and isinglass from the air-bladders of several Russian and American species. Of the twenty or so species only *Acipenser sturio* is found off British coasts.

Sturlason, or Sturluson, *see* SNORRI. Sturm, Christoph Christian (1750-86); a German author and divine, was from 1778 pastor of churches in Hamburg. A rare piety illuminates his *Betrachtungen über die Werke Gottes im Reiche der Natur und der Forschung auf alle Tage des Jahres* (1785) and also his sacred songs.

Sturm, Johann Christoph (1635-1703), a German natural philosopher, was for eight years pastor in a church near Ettingen, but in 1669 accepted the chair of mathematics in Altdorf University. His *Collegium Experimentale* (1672) is a treatise on physics, which betrays the influence of De-cartes.

Sturm, Johannes (1507-89), a German humanist, was educated at the universities of Liège and Louvain, and after a residence in Paris became in 1533 rector of the Strasburg gymnasium, which was later (1566) constituted a university.

Sturm, Julius Karl Reinhold (1816-96), a German poet, spent four years (1837-41) following the theological course at Jena. From 1857 till 1885, the year of his retirement, he was minister in his native village of Küstritz. His *Fromme Lieder* (1852-92) and *Israelitische Lieder* (3rd ed., 1881) are pervaded with a fervent religious spirit, whilst a note of stirring patriotism accounts partly for the popularity of his numerous *Gedichte*.

Sturminster, a vil., 10 m. E.S.E. of Sherborne, on the Stour, in Dorsetshire, England. Pop. (1911) 1900.

Sturm und Drang, *see* GERMANY—*Language and Literature*.

Sturt, Charles (1795-1869), was born in India, and entered the army. He served in the Peninsular War and in the War of the Lakes. Although S. established a reputation as a gallant soldier, his claim to remembrance arises from the explorations which he made in S. Anstralia.

Stuttering, *see* STAMMERING.

Stuttgart, an important city of Germany, cap. of the kingdom of Württemberg, on the Nesenbach, an affluent of the Neckar, 97 m. S.E. of Frankfurt. It occupies a picturesque position in a valley environed with vine-clad hills, and further off with

wooded mountains. The chief features of interest include a 16th-century castle now utilised as government offices, a magnificent palace, the Akademie, and one of the finest libraries in Europe. The manufs. are varied and numerous, and the city is a centre of the printing and publishing trades. The village of Cannstadt, with its mineral springs, is now included within the city limits. Hegel was a native. Pop. 285,589.

Stuyvesant, Peter (1592-1692), a Dutch colonial governor, lost a leg whilst fighting in Saint Martin (West Indies). Governor of New Amsterdam (afterwards New York) from 1647-64, he ceded the city in the latter year to James, Duke of York.

Stye, or Hordeolum, inflammation of the modified sweat glands between the eyelashes. It commences with a hardening of the skin about the part, followed by swelling and soreness. Suppuration of the lower layers of the skin next takes place, and the central core subsequently sloughs off. Gentle fomentation tends to ease inflammation; care should be taken not to irritate the conjunctiva.

Style, Old and New, *see* CALENDAR.

Stylites, St. Simon, or Simeon (Gk. *στυλος*, pillar), a monk of Syria in the 5th century, who spent the last thirty years of his life on a pillar, 72 ft. high and 4 ft. square at the top, erected near Antioch. He preached by day, and crowds of pilgrims flocked to receive his exhortations. He died in 459 at the age of seventy-two.

Styrax, *see* STORAX.

Styria (Ger. *Steiermark*), a duchy and crownland of Austria, with an area of 8662 sq. m., bounded by Upper and Lower Austria (N.), Hungary and Croatia (E.), Carniola (S.), and Carinthia and Salzburg (W.). Its surface is diversified by the outlying spurs of the eastern Alps, the Dachstein (9830 ft.), Hohegolling (9390 ft.), Predigtstuhl (8349 ft.), Grosser Bösenstein, and the Eisenhut reaching the highest elevations. The chief rivers are the Save and the Drave in the S., the Enns in the N.W., and the Raab and the Mur in the central districts. Half the duchy is still forest lands, and maize, oats, rye, and roots are cultivated. There are rich deposits of iron and coal, and scythes, sickles, and other iron and steel goods are manufactured in large quantities. Eisenerz, Leoben, Köflach, and Vordernberg are centres of mining districts. There is a university at Graz, the capital. In Roman times parts of Noricum and Pannonia represented S. Pop. 1,441,604.

Styx (connected with the verb *στυγέω*, to hate or abhor), the name of the principal river in the nether world, around which it flows seven times. S. is described as a daughter of Oceanus and Tothys. As a nymph she dwelt at the entrance of Hades, in a lofty grotto supported by silver columns. As a river S. is described as a branch of Oceanus, flowing from its tenth source; and the river Cocytus again is a branch of the S.

Suabia, see SWABIA.

Suaheli, see SWAHILI.

Suakin, a decaying seaport of the Egyptian Sudan, situated on an island in the Red Sea near the coast, with which it is connected by a causeway. Owing to its unhealthy climate, its importance has declined, and it has been superseded by Port Sudan. It is the port of embarkation for the Mohammedan pilgrims to Mecca, who disembark at Jiddah. It still trades in ivory, gums, cattle, mother-o'-pearl, etc., but its population of 11,000 is steadily decreasing. It has railway communication with Berber, Port Sudan, and Atbara.

Suarez, Francisco (1548-1617), a Spanish philosopher, was largely influenced in his determination to enter the Society of Jesus—which he actually did in 1564—by a powerful sermon of Ramirez, which he heard whilst a student at Salamanca. S. was professor of theology at the College of the Society in Rome (1580-88), and at the universities of Alcalá (1588-96) and Coimbra (from 1597 onward). He greatly incensed James I. by remonstrating against the oath of allegiance in his *Defensio catholica fidei contra anglicanæ sectæ errores*, 1613.

Subahdar, a title for native captains in the Indian army.

Subaltern, see LIEUTENANT.

Subconsciousness, see PSYCHOLOGY.

Subiaco: 1. A tn. of Italy in the prov. of Rome, 33 m. E. by N. of Rome, picturesquely situated in the Sabine Mts. The leading features of the town are two ancient Benedictine monasteries, Nero's villa, and an 11th-century castle, all in ruins. Here it was, in 1464, that printing was first introduced into Italy. Its industries are connected with iron and paper. Pop. 8000. 2. A N.W. suburb of Perth, W. Australia. Pop. 3500.

Subinfeudation, see LAND LAWS.

Subject and Subjective. 'Subject means the mind as knowing something or as affected by a thing, while object is that which is known or which affects the mind in a certain way. The house I see is the object to me, the subject who sees and admires' (Sully). Mind may be known in a

direct, internal, or subjective way, by directing attention to what is going on in the mind at the time of its occurrence or afterwards. So we can attend to any feeling, to see what its nature is, what are its parts, and how it is affected by any particular circumstances. This is known as *introspection*, or the method of internal or *subjective* observation. On the other hand, we may study mental phenomena as they present themselves externally in other minds. This constitutes the external, indirect, or *objective* method of observation. So, for example, we arrive at a knowledge of others' thoughts by their speech, or observe their motives by noticing their actions. Both methods

of our own mental life, and to withdraw attention from the more striking events of the external world and to fix it on the more obscure events of the inner world is obviously a difficult task. On the other hand, there is a tendency, in reading the minds of others, to project our own modes of thinking and feeling into them. Clearly to apprehend the sentiments of an uncivilised African is a difficult task, involving close attention to the differences and similarities of external manifestation, and an effort of *imagination* by which, through our own remembered experiences, we feel our way into a new set of circumstances. See Sully's *Outlines of Psychology*.

Subleyras, Pierre (1699-1749), a French painter, born at Usez. S. first studied painting under his father, and at the age of fifteen was placed with Antoine Rivalz of Toulouse. S. went to Paris in 1724, and in 1726 gained the grand prize given by the French Academy for his 'Brazen Serpent,' and in 1728 he was accordingly sent to Rome, with a pension from the government. In 1739 S. married Maria Felice Tibaldi, a distinguished miniature painter, and they were both elected members of the Academy of St. Luke. S. was patronised by popes, cardinals, and the Roman nobility. There are several fine pictures by S. in Rome, and a few in France (eight in the Louvre). His execution was delicate, he composed well, and was an agreeable colourist.

Sublimation. When a solid, on the application of heat, passes straight to the gaseous state without first becoming liquid, it is said to sublime. On cooling, the solid state is reassumed. S. depends on the fact that the boiling-point of the solid substance is lower than its melting-point at the pressure of the atmosphere. Thus by increase of pressure

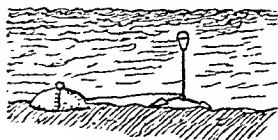
a substance which sublimates can be made to go through a liquid stage before passing into the gaseous state. By sublimation, non-volatile impurities which are originally present are left behind, and thus a method of purifying substances which sublime is established. Arsenious acid, benzoic acid, corrosive sublimate and sulphur are purified by this means. When calomel (mercurous chloride) is sublimed, dissociation takes place, a certain amount of recombination taking place on cooling. With ammonium chloride, the substance is dissociated into ammonia and hydrochloric acid, which recombine on cooling. See DISSOCIATION.

Sublingual Glands, the smallest of the salivary glands, situated one on each side of the floor of the mouth, beneath the tongue. They have numerous ducts, which open along the sublingual fold in the mucous membrane of the floor of the mouth.

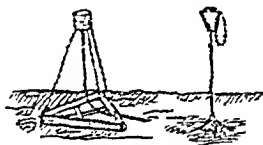
Submarine Forests are evidence of the subsidence of the land. They occur along the Firths of Forth and Tay, on the coasts of Devon, Cornwall, Somerset, Lancashire, and at Grimsby on the Humber. Generally, these forests are rarely depressed far below high-water mark, and consist of beds of peat, some 2 to 6 ft. thick, abounding in trunks and roots of trees in the lower portion, and in mosses in the lighter-coloured upper portion. The trees are chiefly oaks, Scotch firs, alders, hazel, etc., and throughout are embedded hazel nuts, plant seeds, and wing cases of insects.

Submarine Mines are explosives concealed beneath the surface of the sea for the protection of river-mouths, harbours, etc., against a hostile fleet. They are usually charges of wet gun-cotton contained in spherical or cylindrical steel casings, sometimes with a lining of concrete. A charge of 500 lbs. is sufficient to destroy the largest vessel. Wet gun-cotton is used

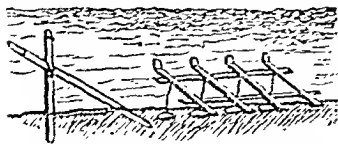
shore station. Floating mines are moored to anchors or heavy weights, so that they float out of sight, but not too deep for contact, or they may be placed, if water is not too deep, on the bottom; this latter type may be smaller but more effective, containing no air for floating purposes. Often the mine floats low or lies on the



bottom, with a float attached containing the firing mechanism. To allow passage of friendly vessels, these floats are sometimes kept low, but can be released by exploding a small charge, when they rise to a position of contact; the mine itself may be kept on the bottom and released in a similar fashion. The attacking fleet, counter-mines or



'drags.' In the former, the suspected area is strewn with mines which are exploded in the hope of firing the defensive mines; in the latter, an extremely dangerous process, two vessels steaming well apart carry forward a cable fitted with grappling irons. When grappled, the mooring cables can be cut and the mine exploded or towed away. Counter-mining is not a very certain method,



because it is difficult to fire and is under safe control: it may be fired by exploding near it a small charge of dry gun-cotton, which itself may be exploded by means of fulminate of mercury. As a rule electrical firing is relied on, determined either by contact of an invading vessel or by cables connected to an observing

concussion being generally insufficient to fire the gun-cotton charges. In harbour or river defence, observation is rendered very accurate by means of the camera obscura, the vessel being observed sailing over a map accurately marked with the mines, which are fired by the pressing of a button at the observed moment.



In any case advantage lies with the defender, and the operations are very valuable in the case of countries with weak navies. The *Lake* type of submarine boat promises to be useful against them. Drift-mines have been used, but are

either party as soon as is lost, and in addition they are a menace to ordinary maritime commerce, as they may drift far afield.

Submarine Navigation. The first reliable practical attempt at S. N. appears to have been in the early part of the 17th century, when a Dutchman, Cornelius Drobbe, successfully navigated a boat, manned by twelve rowers, in the Thames. An interesting part of the invention was a fluid which would restore the 'vital parts' to vitiated air. An inventor, Day, lost his life in a vessel intended to remain under water for twelve hours in 1774, in Plymouth Sound. To Bushnell, an American, belongs the honour of undoubted success; his boat was fitted with two 'ears on the principle of the screw,' a rudder at the stern, a valve to admit water for sinking the vessel, force pumps for driving it out again, and a device for attaching explosives to the bottoms of vessels. His ship was tried in 1775. In 1800 Robert Fulton, of steamship fame, made tests with an egg-shaped boat in the Seine and off Brest, remaining four hours under water, to a depth of 25 ft. He attached a torpedo to the bottom of an old hulk and blew her up. Compressed air was used in this vessel. In 1859 Mr. Delaney, another American, devised a similar vessel, and an American shoemaker, Phillips, is said to have spent a day at the bottom of Lake Michigan with his wife and family in 1851. A German, Bauer, experimented with a boat in 1830, which was lost, but recovered later, and is now in the Berlin Naval Museum; he also carried on experiments for the Russians during the Crimean War. About the same time Scott-Russell, the builder of the *Great Eastern*, built a boat manned by twelve rowers in diving suits. In 1863 both Federals and Confederates tried submarine boats, the latter building the *David*, screw-propelled and steam-driven, but fighting 'awash.' It was armed with a spar torpedo and carried out an unsuccessful attack on an ironclad. Another *David*, a true submarine, was built, and sank the *Housatonic*, though the spar torpedo was carried again in the 'awash' position; this boat was swamped in the manoeuvre and was lost with her crew. In 1866 Herr Flaek lost his life in Valparaiso Bay, with seven others,

in the first trial submersion of a boat he had invented. The Rev. G. W. Garrett in 1876 performed successfully with a small model at Liverpool, and built a larger boat driven by steam under high pressure in a large

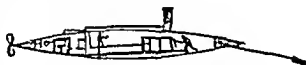
this was lost off the Welsh In conjunction with Nordenfeldt, the Swedish gun-maker, he built two others which were sold to the Greeks and Turks respectively.



THE 'DAVID'

A large one sold to Russia was built at Barrow-in-Furness, came round to the Solent, but was wrecked on the journey to St. Petersburg. These were all fitted with vertical screws. Mr. J. F. Waddington of Liverpool constructed a boat with horizontal rudders, driven by motors regulated by a pendulum for keeping the boat level.

M. Goubet (1885) built a successful submarine boat, and four others were in use in 1897 in the French navy; these were electrically propelled and fitted with compressed air reservoirs. In 1888 the *Gymnote*, designed by M. Gustave Zédé after the idea of M. Dupuy de Lôme, was built; the outcome of the trials was the building of the *Gustave Zédé*, 1898, 160 ft. long, 270 tons, with electric motors developing 360 h.p., which was very successful in actual manoeuvres. This was followed by the *Moose* and the *Farsardel* type, improvements on the *Gustave Zédé*, and the *Narval*. The last named is oil-driven on the surface, with electric work. The latest tons. Another after its inventor, and launched at Cadiz, was very successful.



SPAR TORPEDO

British submarines have followed the inventions of J. P. Holland, an American inventor. The No. 7, after designs submitted in 1895 to the U.S. government, was 85 ft. long, with a displacement of 100 tons, but not completed; No. 8, 73 tons, contained improvements. Others were built in 1896 and 1901, and designs were purchased by the British government, five boats being built by Messrs. Vickers, Ltd. These were of 120 tons, 61 ft. long, 12 ft. wide, ell

driven (190 h.p.) on the surface, electrically when submerged; surface speed 8 knots, submerged 5 knots. The armament consisted of a single torpedo tube forward. The A class, an improved type, have conning towers and periscopes, 200 tons displacement, surface speed 12 knots, submerged 7 to 9 knots. The B class, 314 tons, are capable of voyaging 2000 m. on the surface, 150 m. below. Other classes have been built—the E, 810 tons. The change in shape has tended to a raising of the back with increased comfort. Four torpedo tubes are carried, and two 3-in. quick-firing guns.

In America, the *Hollands* have been similarly improved, but other types are in use. The *Lake* type, named after the inventor Simon Lake, contain an air-lock through which divers may emerge. *Argonaut I.*, 1897, of this type is 36 ft. long, carries a gas engine and propeller, dynamo, search-light, and pumps for air and water; it travels on the bottom on wheels, and promises to be useful in discovering mines and their cables. These vessels have been adopted by Russia. Germany started with *Hollands*, while they have developed along their own lines. The submarine boat is found in all navies now, and has become quite an efficient craft; displacements of 1000 tons are looked forward to, and speeds as well as radius of action have shown great improvement. The Diesel engine has been largely responsible for this. In manoeuvres the craft have come up to expectation completely, but no experience in actual war has been obtained yet.

See Burgoyne, *Submarine Navigation*, 1903; Pesce, *La Navigation sous-marine*, 1906; Fyfe, *Submarine Warfare, Past and Present*, 1907; Sueter, *The Evolution of the Submarine Boat, Mine, and Torpedo*, 1907; Field, *The Story of the Submarine*, 1908; Corbin, *The Romance of Submarine Engineering*, 1913.

Submaxillary Glands, a pair of salivary glands situated far back beneath the lower jaw on each side. Each gland is about the size of a walnut, and discharges its secretion by the submaxillary or Wharton's duct opening on the sublingual papilla on the floor of the mouth.

Subpœna, the name of the writ for calling a witness to bear evidence (*subpœna ad testificandum*). It is only applied for where it is feared the supposed witness will not voluntarily come forward or is actively hostile to the party calling him. The writ for calling upon any person to bring to court books, deeds, or other documentary evidence is called a *subpœna*

duco tecum. The name is derived from the dominant word in these writs which calls on the party *subpœna centum librorum* (i.e. under penalty of £100 if he neglects to do so).

Subrogation. The principle of S. in insurance is a deduction from the well-established rule that a contract of insurance of property is no more than a contract of indemnity. The principle as stated in the leading case of *Castellain v. Preston* is that as between the insurer and the insured, the former is entitled to the advantage of every right or remedy legal or equitable of the latter, by the exercise of which rights and remedies the loss insured against can be or has been diminished.

Subsidence, or Depression of the Land, is one of the great secular movements of the earth's crust, caused probably by the contraction of the earth on cooling. Evidence of depression is afforded by submerged forests, fjords, coral islands, and by the disappearance of human construction. Submerged forests occur at several places on the English coasts and in Holland and N. France. Fjords of Norway and the firths of Scotland are evidence of submerged valleys. On the coast of Dalmatia, Roman roads and villas are reputed to be visible below the sea. In S. Sweden streets are submerged, and on the coast of Greenland a space of more than 600 m. is perceptibly sinking.

Subsidies: 1. Taxes in aid, as tho S. formerly granted to the kings of England. S. were a tax imposed not immediately on property, but upon persons in respect of their reputed estates, at the nominal rate of 4s. in the £ on lands, and 2s. 8d. on goods or personalty. On the abolition of S. a land tax was substituted. 2. A sum of money paid by one state to another under the terms of a treaty, to purchase the service of auxiliary troops, or to acquire the aid of a foreign state in a war against an enemy. Thus Great Britain paid S. to Austria and Prussia to engage them to resist the progress of the French in the Seven Years' War.

Subsoil, the layer of soil which usually occurs under the true soil; it sometimes extends downwards to a great depth, but in a hilly or rocky district is frequently absent altogether. It is always lighter in colour than the true soil and is lacking in organic material, though it often contains plant food which has been washed down. As a rule there is little or no advantage in incorporating any of the S. with the layer above, but if it is broken up by deep digging or by the S. plough, deep-rooting plants are benefited.

Substance, a word connected with certain discussions in logic and metaphysics. S. is correlative with Quality or Attribute. Every S. must have attributes, and every attribute must be the attribute of some S. But as every power or property of a thing, every way that the thing affects us, may be called an attribute or a quality, then if all the attributes are counted off there is nothing left. To avoid this seeming inconsistency, it was assumed that everything possesses besides its attributes an unknown substratum, that they rest upon, or inhere in, a mystical inscrutable bond, that holds the attributes together, without being in itself an attribute. This assumption was repudiated by Locke and others, who found a meaning for S. without departing from the knowable. Every object has some *fundamental* or *essential* quality, which being present preserves its identity, and which, being removed, it is no longer the same S. but another. Thus the S. of matter is not the remnant after all the qualities are subtracted; it is the two fundamental qualities, Extension and Resistance. So long as these are found in any degree we may vary size, shape, odour, colour, etc., and yet we have matter. So the S. of Mind is whatever we regard as its fundamental essence. Feeling, Volition, or Intellect, or a composition of all three, may be adopted according as we define Mind. Then these would be Mind, not would *inhere* in Mind. Notwithstanding the obviousness of this explanation, the employment of the words S. and Attribute has led to a demand for something underlying all attributes—a S. of body and a S. of mind, something distinct from anything meant by the names. So many philosophers have preserved the phantom as a thing of belief, if not of knowledge. The doctrine of an unknowable S. in the abstract very early allied itself with the theory of the perception of a material world. Other names for this contrast are *noumenon* and *phenomenon*. The latter is what shows itself to our senses or is conceived by our intelligence—the qualities of extension and resistance in matter, and of feeling, etc., in mind. The *noumenon* is something apart and beyond, inconceivable and unknowable, but which, it is affirmed, we are instinctively led to believe in. See DESCARTES, LOCKE, BERKELEY, HUME, and KANT.

Substitution. In Roman law no man could 'institute' or name an heir to his own heir who was past pupillarity (minority), so that substituted heirs or Ss. could only take effect as *conditional institutions*: i.e. the sub-

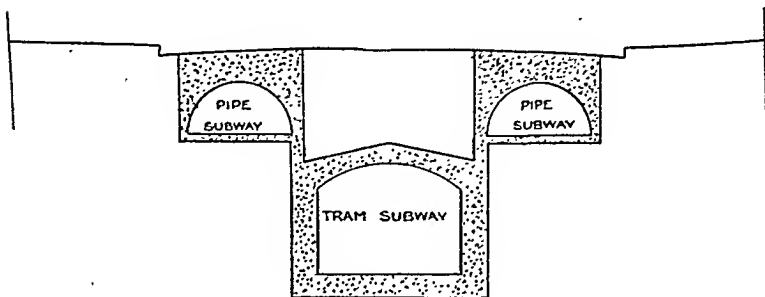
stitution could only succeed in the event of the *institute* proving unwilling to take up his inheritance. In Scots law clauses of S. in tailzies (entails) of heritable property give the substitute a right as heir of provision at what time soever the *institute* dies. Ss. In wills, marriage contracts, and bonds, however, do not as a rule amount to more than *conditional institutions*.

Subways. Many large cities are now adopting the system of constructing S. under the footways of streets to be used for telegraph wires, electric light and power cables, gas, water, and other pipes. These S. are so constructed that there is room for a man to walk and work in, while at intervals inspection entrances are constructed, thus removing the necessity of breaking up the footways when it becomes necessary to repair the pipes underneath. Paris has adopted this system, and in some of the more recent streets of London there is a passage or S. under the footway, notably Kingsway, Queen Victoria Street, and the Thames Embankment. The latter is 9 ft. wide and 7 ft. 3 in. high. The provision of these S. is of great benefit to the companies whose cables are in them, as it enables them to examine the whole length of their pipes instead of portions only, giving at the same time greater facilities for repairs without obstructing the vehicular and pedestrian traffic. S. have also become a great feature in the underground system of railways, connecting different tube railways together, e.g. the S. connecting the Great Northern Railway station at King's Cross with that of the Metropolitan District Railway station at the corner of Gray's Inn Road, and those connecting the King's Cross station on the City and South London Railway with St. Pancras station, or that now under construction between Charing Cross of the Hampstead Tube and the District Railway station. Another very important and effective feature is the construction of S. at the junction of some of the important thoroughfares of our large cities to avoid the congestion of pedestrian traffic at these points and lessen the danger to life. Such S. have been constructed at the corner of Queen Victoria Street, New Bridge Street, and the Thames Embankment; also at the end of Parliament Street, and across the Broadway at Hammersmith, the two latter having lavatory accommodation attached to them. There can be no doubt as to the value of these S. The S. at the Mansion House is one of the most wonderful engineering feats la

London. There is a collection of S., really in fact the underground replica of the streets on the surface. The new Kingsway has, in addition to its pipe S., a tram S., extending along the whole length and joining the Thames Embankment under Waterloo Bridge. This S. varies in width, but is about 20 ft. wide and 13 ft. high, one part of the roof being constructed of brick arches and the other of steel troughing. The Thames has been tunnelled four times for the con-

struction of public S., two for vehicular traffic, viz. the Blackwall Tunnel and the Rotherhithe Tunnel; and twice for foot passengers, at the Tower and at Greenwich. The Tower S., now in disuse as a foot S., is 7 ft. in diameter, and was constructed in 1869-70 at a cost of about £10,000. Blackwall Tunnel, 25 ft. in diameter, was constructed in 1892-97, and cost £371,000. The Rotherhithe Tunnel, 28 ft. in diameter, was constructed in 1908. The Greenwich S. is 11 ft. in diameter; it was constructed in 1902 at a cost of about £30,000.

1707, and 1709. The Act of Settlement (1) declares that if a Papist obtains the crown, the subjects of the realm are thereby absolved of their allegiance; (2) settled the crown on the Electress Sophia and the Protestant heirs of her body; and (3) expressly excludes all persons holding communion with the Church of Rome, professing the popish religion, or marrying a Papist.



Succession. The law of S. is that according to which the S. to the property of deceased individuals is regulated. This may be (a) in cases where a deceased party has died intestate, when the order of S. is according to fixed rules for the most part based on the canon law (see DISTRIBUTION, STATUTES OF; INHERITANCE; and PRIMOGENITURE). (b) According to a settlement (q.v.) by deed, will, or other instrument, under which land or any interest in land, or other property stands for the time being limited (see LIMITATION) to or in trust for any persons by way of S.

Succession, Apostolic, see APOSTOLIC SUCCESSION. Succession Acts. The succession to the crown of Great Britain is settled by the Act of Settlement, 1701, confirmed, as to the Protestant succession, by Acts passed in 1702, 1706,

middle of the 17th and the middle of the 18th centuries, on the occasion of the failure of a sovereign house. The most important of these wars were those of the Orleans succession to the Palatinate (1686-97), closed by the peace of Ryswick; of the Spanish Succession (1700-13); of the Polish Succession (1733-38), closed by the peace of Vienna; of the Austrian Succession (1740-48); and of the Bavarian Succession (1777-79), called, in ridicule, the Potato-war. See AUSTRIA and SPAIN (History).

Succinic Acid ($C_4H_4O_4$), a dibasic acid which occurs in amber, and from which it is prepared by distillation in iron retorts. It can be obtained synthetically from its elements or from ethyl acetoacetate or ethyl malonate. It crystallises in colourless prisms (melting point 185°), readily sublimates, has an unpleasant acid taste, and is only sparingly soluble in cold water, alcohol, and ether.

Succory, see CHICORY.

Succubi, see DEMONOLGY.

Succulent Plants are those which have developed fleshy parts owing to the storage of food in them. Thus the cacti store food in thick stems, the leaves of which are reduced to scales or thorns, and in many other plants, e.g. the aloe and agave, the leaves are fleshy and packed with food.

Suchow, or Soochow, a tn. built on a group of islands E. of Lake Tai-lu, 56 m. W.N.W. of Shanghai,

in the prov. of Kiang-su, China. There are 7000 silk looms, and the city is noted also for its cheap reprints of Chinese classics. A vast and splendid city in the middle ages, Suchow is still suffering from the effects of its demolition at the hands of the Taipings in 1860. Pop. 500,000.

Suchot, Louis Gabriel, Duc d'Albaféra (1772-1826), marshal of France; covered himself with glory during the Napoleonic campaigns. At the siege of Toulon (1793) he took General O'Hara prisoner. As commander of the left wing of Masséna's army, he repelled the Austrian troops under Melas (1800) and so saved France from a southern invasion. Having assisted in securing the capitulation of Saragossa, he was made generalissimo of the army of Aragon (1809), and in two years completely pacified that province. In 1810 he defeated the Spanish general, O'Donnell, and captured Lerida; two years later he crushed Blake's army and became master of Sagunto and Valencia.

Suck, a trib. of the Irish Shannon, into which it flows, 8 m. S.E. of Ballinasloe. It is a boundary between Rosecommon and Galway. Length 60 m.

Sucker, the term applied in botany to an aerial branch given off by an underground stem. It runs for a short distance under the soil, then pushes upwards to form a new plant. Examples are the rose and mint.

Sucking-fish, a term applied to all members of the acanthopterygian family Echenididae, the Remoras, in the division Dissocephali, on account of the suetorial oval disc they bear on the upper part of the head. By means of this disc they attach themselves to large floating objects, such as ships, or swift-swimming animals, as sharks, and they are to be found in all seas. Other S. are the suckers, which form the family Gobiescoideæ, and the lumpsuckers, which form the Cyclopteridae.

Suckling, Sir John (1609-42), an English poet, born at Whitton, Middlesex. He inherited an ample fortune on the death of his father in 1627, and travelled abroad. On his return in 1630 he was knighted. Some of his shorter pieces are incomparable for charm and daintiness, such as *Constancy*, and the songs *I prithee send me back my heart*, and *Why so pale and wan, fond lover?* His works were collected posthumously in *Fragmenta Aurca* (1646). There is a biography by Alfred Suckling (1836).

Sucré, or Chuquisaca (Indian for 'golden bridge'), a tn., 8839 ft. above the sea and 48 m. N.E. of Potosi, in the dept. of Chuquisaca,

Bolivia. Its halls of congress and president's palace remind the inhabitants that their city was once the headquarters of government. A bishopric since 1552 and the seat of the archbishop of La Plata and Charcas since 1609, it possesses a cathedral dating back to 1553. The University of San Xavier was founded in 1624. In the vicinity are orchards and vineyards. Pop. 23,500.

Sucrose, see SUGAR.

Suction Gas Plants see GAS MANUFACTURE—Gas for fuel or power.

Suetorial Crustaceans are those belonging to the group Rhizocephala. They are parasite on other crustaceans, and many of them obtain their nutriment from crabs.

Suczawa, a tn. of Bukowina, Austria, on the Roumanian frontier. It was the former residence of the Moldavian princes, and it carries on fancy leather industries. Pop. 11,539.

Sudamina, or Miliary Eruption, an eruption of whitish vesicles due to disturbance of the functions of sweat-glands in the course of most fevers. It is non-inflammatory and not dangerous, consisting of a collection of sweat in the ducts of the sweat-glands.

Sudan, or Soudan, formerly the name of a vast tract of equatorial Africa lying S. of the Sahara Desert and Egypt, and stretching from Cape Verde on the W. coast to Massowah on the E. It extended S. to the Congo basin and the equatorial lakes, with Abyssinia and British E. Africa forming its E. boundary. It was also known as Negritia, or Bilad-es-S., 'the Land of the Blacks.' Later it was divided into three geographical portions: French S. on the W., Central S. and the Anglo-Egyptian S. on the E. The S. included Senegal, the Fula country, portions of French Congo (now French Equatorial Africa), the Guinea Coast (now split up into various

of the
Congo Belgian
Congo), Adal,
Kanem, many
other minor states. The French have extended their possessions by exploration and military occupation from the W. coast eastwards beyond Lake Chad to the confines of Wadai in Central S., and southwards to the Ubangi and Congo rivers. As the various regions lying within the western half and southern portions of the S. have, by a series of international conventions and treaties, been delimited (for further details concerning the colonies, see tl
GAL. NIGERIA,
AFRICA, BELGIAN CONGO, etc.), therefore only the eastern portion, the

Anglo-Egyptian S., will be dealt with here. This region lies S. of Egypt and extends southwards to Uganda and the Belgian Congo, in lat. 5° N., a distance of about 1300 m., and from Wadai in the W. to the Red Sea in the E., about 1200 m. It is bounded on the S.E. by Italian Eritrea and Abyssinia, whose frontiers have been recently demarcated. The area is computed at 984,500 sq. m., and the pop. is estimated at 3,000,000. The Nile traverses the region from N. to S., with a large bend westwards about lat. 20° N., enclosing part of the Nubian Desert, which extends to the Red Sea coast. The Libyan Desert lies to the immediate W. Where the Nile enters the Anglo-Egyptian S., it is known as the Bahr-el-Abiad (or White Nile), the waters of Sobat rivers.

the Bahr-el-Azrek (or Blue Nile), an important affluent flowing N.W. from Abyssinia; henceforth it flows on as the Nile, taking in the Atbara below Berber. Between Wady Halfa and Khartum there are several cataracts and rapids which impede navigation. Along the shore of the Red Sea, running almost parallel to it, is an extensive range of mountains, which attain their highest elevations in Jebel Erba (7480 ft.) and Jebel Soturba (6889 ft.). The chief ports along a coast-line of nearly 400 m. are Port Sudan and Suakin (q.v.). S.E. of Khartum is Kordofan, a plateau of some 2000 ft. elevation, while further W. is Darfur, with heights exceeding 6000 ft. The most fertile regions are those lying W. and S. of Khartum, watered by the Atbara and the Blue and White Niles. Here there are large areas under durra (native food), millet, sesame, and pulse, which might advantageously be planted with cotton and wheat. Cotton plantations have been successfully laid out in the Tokar district, as well as near Dongola, where the completion of irrigation works has enabled the land to be brought under cultivation. On the banks of the White Nile the soil is not so favourable, but in the forests near by the gum acacia, ebony tree, the rubber creeper, and the bamboo are found. The upper reaches of the Blue Nile flow through dense forests which extend as far as Abyssinia; here valuable fibres and tanning materials abound. In the Bahr-el-Ghazal district the finest rubber is yielded, while Kordofan has forests containing gum trees in great abundance. N. of Khartum the country is mainly desert, save for narrow strips of cultivated land on the banks of the Nile.

The chief towns are: Khartum (pop.

18,235), Omdurman (pop. 42,779), Khartum North (pop. 32,285), Wady Halfa, Berber, Merowe, El Obeid, Port Sudan, Suakin, Kassala, Nahud, Wad Medina, and El Damer. The railway from Wady Halfa to Khartum was opened in 1899, and a branch line to Port Sudan was opened in 1896. From Khartum the line was extended to El Obeid, and further branches and extensions are in course of construction: the total mileage open is over 1500 m. Government passenger and cargo steamers ply the Nile, and regular services are established over 2250 m.

The chief products are ivory, gum, gold, ostrich feathers, cotton, cereals, and dates; coal, clothing, machinery, and railway plants are imported. In 1911 the imports amounted to £1,234,749, and the exports were valued at £910,771.

The northern part of the Anglo-Egyptian S. contains many interesting antiquities, notably the rock-hewn temple at Abu Simbel and the pyramids and temples near Wady Halfa. Archaeologists are still working in these districts, and are every year bringing to light ancient Egyptian works of art and inscribed relics which, when pieced together and translated, may throw much light on the ancient history of the country. The Anglo-Egyptian S. is parcelled into thirteen provinces, each administered by a governor with subordinates, controlled by a governor-general, who is assisted by a council. Instruction is carried out by a comprehensive educational system; there are elementary, primary, or secondary schools in all the principal towns—the Gordon colleges at Khartum and Omdurman being the chief educational establishments.

It was formerly under the domination of Egypt, whose rule was severely checked by the revolt of the Mahdi in 1882. His successor, the Khalifa, held his own for nearly sixteen years, desolating the country far and wide, grinding the people under the heel of oppression. However, in 1898 the forces of the Khalifa were annihilated and he himself slain at the battle of Omdurman by the British and Egyptian forces under the command of Lord Kitchener. Thereafter the country came under Anglo-Egyptian rule. It has not yet recovered from the devastating effects of the Dervish tyranny, whole districts having been depopulated; but now there is every sign that the country has before it a prosperous future, towards which it will be led by a wise and careful administration. See Wallis Budge, *The Egyptian*

Sudan, 1907; Slatin Pasha, *Fire and Sword in the Sudan*, 1896; Lord Cromer, *Modern Egypt*, 1908; and article by F. R. Cane, *Ency. Brit.*, 11th ed.

Sudbury: 1. A market tn. and municipal bor. of Suffolk, England, on the Stour, 59 m. N.E. of London and 16 m. S. of Bury St. Edmunds. There are flour-mills, malt, lime, brick, and tile works. Pop. (1911) 7141. 2. A tn. of Ontario, Canada, in the dist. of Nipissing, 60 m. N.W. of Lake Nipissing. There are considerable deposits of copper ore, etc. Pop. 4500.

is of aquatic
over large

It forms an almost impenetrable obstruction to navigation, but is believed to be likely to pay for its removal by being dried and compressed into briquettes for fuel, which is particularly scarce and expensive in the district. Experiments in this connection have been in progress since 1910.

Sudermann, Hermann (b. 1857), a German novelist and dramatist, born at Matziken, E. Prussia; educated at Königsberg and Berlin; became editor of *Deutsches Reichsblatt*, 1881. His works (published in England by John Lane) include the novels: *Frau Sorge*, 1887; *Katzensteg*, 1889; *Es War*, 1894; *Das hohe Lied*, 1908 (Eng. trans. by B. Marshall, 1913); and the dramas: *Die Ehre*, 1890; *Sodom's Ende*, 1891; *Heimat*, 1893; *Das Glück im Winkel*, 1896; *Die drei Reiterherfodern*, 1899; *Johannisfeuer*, 1900; *Das Blumenbeet*, 1905; and *Der Bettler von Syrakus*, 1911.

Sudetic Mountains, a mountain system of S.E. Germany, which extends from the Biezwa basin in Moravia to the Saxony and Bohemia borders. The principal divisions are the Riesengebirge, Isergebirge, Glatzer, Adlergebirge, Eulengebirge, etc.

Sudorifics, see DIAPHORETICS.

Súdras, see CASTE.

Sudsha, see SUJA.

Sue, Joseph Marie (1804-59), a French novelist, known as Eugène S., born at Paris. S. belonged to a family of distinguished physicians, and originally studied the family profession, but soon gave it up for a military career. After pursuing his adventures both by land and sea for a number of years, he returned to Paris in 1831, and the same year his novels *Plick et Plock* and *Afar Gull* were published. In 1835-37 his conspicuous failure, *L'Histoire de la Marine Française*, was published, which provoked the waggish jocularity of some officers of Toulon. Numerous romances followed this historical attempt, in which vice

triumphed over virtue. In 1840 S. resolved to try the virtuous novel, which had amazing success. One of the great literary events of Louis Philippe's reign is described in his *Mathilde* (1841), which was followed by *Les Mystères de Paris* (1842), *Le Juif Errant* (1844-45), *Martin l'Enfant Trouvé* (1847), and *Les Sept Péchés Capitaux* (1847-49). The *Mystères du Peuple* (1849-56) was suppressed in 1857. In 1848 S., who was an extreme Socialist, was elected a representative of the Assemblée Nationale; but on the election of Napoleon III. he was expelled from the French territory, and retired to Annecy.

Sueca, a tn. in the prov. of Valencia, Spain, in an orchard- and grain-growing dist., 20 m. S. of the city of Valencia. Pop. 14,500.

Suet, the solid fat obtained from the abdomens of cattle and sheep. It is largely used in cooking and also in the production of tallow by rendering down. As an emollient it is utilised in ointments and other medicinal preparations.

Suetonius, Gaius Suetonius Tranquillus (c. 75-160 A.D.), a Latin historian, grammarian, and critic, born at Rome, the son of a Roman officer; became an advocate and later magister epistolarum to the Emperor Hadrian. His *Vita Duodecim Cesarum* is almost complete. A translation is in Bohn's Classical Library.

Sueur, Eustache Le (1617-55), a French painter and sculptor, born at Paris; studied under Vouet. His works include 'Scenes from the Life of St. Bruno,' 'St. Paul healing the Sick before Nero,' 'St. Paul preaching at Ephesus,' etc.

Suevi (modern *Swabians*), a Germanic people, said by Caesar to inhabit Baden, and by Tacitus a regieu to the N. and E. of this.

Suez, a seaport tn. of Egypt, at head of Gulf of Suez and W. of the mouth of the Suez Canal, 76 m. E. of Cairo. Port Ibrahim, 2 m. S. of Suez, is a fine harbour at the entrance to the Canal. The town, which is surrounded by desert, is unattractive in appearance, but is clean and has a good climate. Pop. 19,000.

Suez, Gulf of, the W. arm of the Red Sea after its bifurcation in lat. 28° N., whence it extends N.W. for 190 m. to lat. 30° N. Average breadth, 30 m.

Suez, Isthmus of, the neck of land connecting Asia and Africa, having S. the Gulf of Suez and N. the Mediterranean, and through which is cut the Suez Canal (q.v.). Minimum width, 72 m.

Suez Canal, a waterway cut through the Isthmus of Suez to connect the Mediterranean and the Red Sea. Such

a canal seems to have been constructed in the time of Seti I. (1380 B.C.), and is referred to in inscriptions in the temple of Karnak, and frequent projects were entertained during ancient and mediæval times. The first serious steps towards the modern canal were taken by Napoleon in 1798, and in 1846 the Société d'Études pour le Canal de Suez was formed by Prosper Failliot. Little progress was made till, in 1854, Ferdinand de Lesseps came forward and constituted the Compagnie Universelle du Canal Maritime de Suez, and drew up a scheme in concert with two French engineers, Linant and Mougel. This was passed by the International Commission with a few alterations, and the work was begun in 1856. The canal was opened for working in November 1869. The total expenditure of the company was 432,807,822 francs. The canal was enlarged and improved in 1885-89, the depth finally being 9 metres, and the minimum width in straight parts from 65 to 75 metres, according to location, and on curves 80 metres. The canal runs from Port Said along the edge of Lake Menzala, through the Bala Lakes, Lake Timsa, and the Great and Little Bitter Lakes to Port Ibrahim. The total length is 87 m., of which 21 m. are in lakes. It can be used by the largest vessels, and the average time of transit is about sixteen hours. A freshwater canal runs from the Nile to Lake Timsa, with branches parallel to the maritime canal. The dues paid by vessels are being lowered on a sliding scale, and in 1906 were 7½ francs per ton, and 10 francs per head for passengers. In 1911, 4969 vessels, with a net tonnage of 18,324,794, passed through. The receipts were £5,522,000, and 275,259 passengers were carried. For diagram of the canal, see *Everyman's Historical Atlas of Asia*.

Suffioni, the name of hot sulphurous exhalations, common in the region of volcanoes.

Suffocation, see ASPHYXIA.

Suffolk, an E. co. of England, bounded N. by Norfolk, S. by Essex, E. by the North Sea, and W. by Cambridgeshire. The coast-line is generally low and regular, and has in places been much encroached on by the sea, the original port of Dunwich having entirely disappeared. The principal openings are formed by the estuaries of the Deben, the Orwell, and the Stour. On the coast are several well-known watering-places, including Lowestoft, Southwold, Aldeburgh, and Felixstowe. The surface of the county is low and undulating; in the N.W. there is a small tract of Fen country and a range of

low chalk hills (352 ft.), while in the N.E. there are broads as in Norfolk (q.v.), and in the N.W. a tract of heath land known as the Breckland district. The chief rivers, besides the three mentioned above, are the Waveney, Blythe, Alde (or Ore), and the Lark. Nearly the whole county is under cultivation, the soil being extremely fertile. Barley, oats, and wheat are all grown extensively, and farming is in a very flourishing condition. Cattle, sheep, pigs, and poultry are reared, and a breed of horses used for agricultural purposes known as the Suffolk Punches. The coast fisheries are important, Lowestoft is the centre, herrings and mackerel forming the chief catch. The

connected implements (for which is the chief; there are also chemical and gun-cotton factories, and silk, cotton, linen, woollen, horse-hair and cocoa-nut matting works. The chief ports are Lowestoft, Aldeburgh, Woodbridge, and Ipswich. Communication is good. The county is divided into two divisions for administrative purposes, contains twenty-one hundreds, and five parliamentary divisions, each returning one member. S. formed part of the kingdom of E. Anglia. Walton was the scene of the landing of the Earl of Leicester in 1173, when he marched against Henry II., and later of Queen Isabella and Mortimer. Mary raised an army in the county, and during the Civil War it was a stronghold of the parliament. There are also numerous churches, remarkable for their decorative work in flint and for their round towers, those of Little Saxham, Herringfleet, Blythburgh, Lavenham, and Long Melford being perhaps the finest. The ancient castles of Blod, Framlingham, and Orford also deserve mention. Area 1455 sq. m. Pop. (1911) 382,748. See *History and Antiquities of Suffolk*. (16-48), and *Vie-*

Suffolk, a tn. of Virginia, U.S.A., in Nansemond, 75 m. S.E. by S. of Richmond. Pop. (1910) 7008.

Suffolk, Charles Brandon, Duke of (1484-1545), the son of William Brandon, and was brought up at the court of Henry VII., with whom he was a great favourite. He distinguished himself in the French campaign in 1513, was created Viscount Lisle in that year, and Duke of Suffolk a year later. On the occasion of Mary Tudor's marriage he took part in the jousts.

Suffragan, see BISHOP—Suffragan bishops.

Suffren de Saint Tropez, Pierre André de (1726-88), a French admiral, was born at Saint-Caunal, Provence, France, and entered the French navy in 1743. He was twice captured by the English, and was made captain in 1772. After serving in Malta, he fought five indecisive battles against the English under Admiral Hughes in 1782 and 1783. He returned to France at the conclusion of the treaty of Versailles, and was created a vice-admiral.

Sufism (probably from Arabic *suf*, wool, the fabric of the plain garments enjoined by Islam), originally a Persian revolt against Mohammedan ritual; it became a distinct religious movement in its final mystico-pantheistic form, of which the greatest exponent was Zoroaster. S. interprets God, the one Being, as infinite moral good and eternal æsthetic beauty, the ecstatic lover for whom shall relieve the soul of the pain of human desires. To attain to this ecstasy, S. demands implicit obedience to, and utter concentration of the mind emotionally and intellectually on, the Divine Being. Although often associated with Buddhism (which denies the soul) and the Supreme Being, and seeks coma instead of ecstasy) and with Christianity, it is probable that the strongest external influence which has affected S. is Neo-Platonism; but in the main it was a purely internal and national reaction, analogous in a way to Christian mysticism of the middle ages. S. has coloured almost the whole of Persian literature; the hedonistic writings of Hafiz, Sadi, and Omar are generally accepted as symbolical of sufistic ideals. See various vols. in Murray's *Wisdom of the East Series*, also Vaughan's *Persian Mystics in the Middle Ages*, 1856.

Sugar, the name used to describe a number of sweet-tasting aldehyde or ketonic alcohols. The sugars constitute a large section of the carbohydrates and may be classed into two groups: (1) Monoses (molecular formula $C_6H_{12}O_6$); (2) Bioses (molecular formula $C_{12}H_{22}O_{11}$). The former are not decomposed by dilute acids, but the latter are readily hydrolysed, yielding two molecules of the same or different monoses. Glucose (dextrose or grape sugar), mannose, galactose, and fructose (levulose) are monoses, while sucrose (cane sugar), maltose, and lactose are bioses. In this article sucrose alone will be considered, the other sugars being described under fructose, galactose, etc. Cane sugar, saccharose, or sucrose ($C_{12}H_{22}O_{11}$) occurs in large quantities in the ripe sugar cane (20 per cent.) and in beetroot (16 per cent.), in smaller quanti-

ties in other fruits. The sugar of commerce is manufactured from the sugar cane and from beetroot, the processes of extraction being more or less similar. The material is crushed between hydraulic presses and the expressed juice boiled with 1 per cent. of milk of lime to neutralise acids present and to prevent fermentation. (With beet, the material is sliced and treated with hot water and the solution boiled with lime.) The solution is treated with carbon dioxide to precipitate excess of lime, decolorised as much as possible by boiling with animal charcoal, and then filtered. Evaporation under reduced pressure by steam then follows, until the syrup deposits crystals on cooling. The crystals are separated from the brownish coloured mother-liquor (molasses or treacle) by centrifugals, and are purified by recrystallisation from water. The syrup still contains about 50 per cent. of sucrose which will not crystallise, but is extracted by adding strontium hydroxide. Strontium sucrate is deposited, and the precipitate is collected, suspended in water and decomposed by passing in carbon dioxide. The filtrate is evaporated to a syrup which yields crystals of sugar. Cane sugar crystallises from water in large four-sided prisms (sugar candy). It is very soluble in water (three parts of sugar dissolve in one part of water at ordinary temperatures), but is insoluble in alcohol. It melts at $160^{\circ}C$, solidifying on cooling to a pale yellow glassy mass called barley sugar. At about $200-210^{\circ}C$ sucrose loses water, and is converted into a brown mass called caramel which is used for colouring soups and gravies, etc. Sucrose does not reduce Fehling's solution; it is charred by sulphuric acid, forming a carbonaceous mass which is distended by the steam, carbon and sulphur dioxides being evolved. On then treating with a mineral acid, sucrose is hydrolysed (inverted) to a mixture of glucose and fructose. Solution of sucrose is dextro-rotatory, while after hydrolysis the solution is levo-rotatory, hence the term 'inversion' of sugar. The mixture of glucose and fructose is called 'invert sugar,' and is used in the manufacture of preserves, etc. The annual production of cane sugar is about nine to ten million tons.

Sugar Beet, a very important sugar-yielding field crop, derived, like the mangold, by selection and by systematic breeding from the sea beet (*Beta maritima*), a common perennial on muddy sea shores (order Chenopodiaceae). Sugar was first extracted from the beet in 1747 by Marggraf.

The first factory for the commercial extraction of the sugar was built near Breslau in 1799 by Achard; and Napoleon, a few years later, encouraged and expanded the new industry. About 5,000,000 acres are now devoted to the world's crop, but until 1910, except for spasmodic experiments, sugar was not grown in Britain. In 1912 the first modern factory was opened at Cantley, Norfolk. Experimental and educational assistance from the Development Commission promised in 1913 to establish the industry permanently, it having been demonstrated that the crop can be satisfactorily grown in Britain. See *Sugar Beet* by 'Home Counties'; *Sugar Cane and Beet* by George Martineau.

Suhl, a tn. of Schleusingen, Prussian Saxony, at foot of the Domberg, on R. Lauter, 12½ m. N.E. of Meiningen. It is famous for its manuf. of arms, and has iron foundries and potteries. Pop. 14,466.

Suhm, Peter Frederick (1728-98), a Danish historian; author of *Historie af Danmark* (24 vols., 1782-98). Tho last seven vols. were published after his death by Kall and Nyerup, 1806-28.

Suicer, Johann Caspar (1620-84), a Swiss scholar and theologian, born at Zürich, and became professor of Greek and Hebrew in the University there. His chief work is *Lexicon, sive Thesaurus Ecclesiasticus Patrum Græcorum* (2 vols., 1682).

Suicide. A *felo de se* or S. is by English law a person who, being of years of discretion and in his senses, takes his own life. The absence, real or supposed, of this last condition is now very generally assumed by coroners' juries in order to save the reputation of the deceased, to ensure Christian rites of burial, and, doubtless, to express sympathy with deceased's dependents. It is also, by English law, S. to kill oneself unlitentionally in an endeavour to kill another maliciously. If two persons, as commonly happens among youthful lovers, agree to commit S. together and one escapes and the other dies, the survivor is guilty of murder.

Suidæ, see Pto.

Suidas, a Greek lexicographer of about 10th or 11th century A.D. His lexicon is frequently quoted by Eustathius (12th-13th century). It is an encyclopedic dictionary, with numerous literary quotations of considerable value, though uncritical and unequal. It was compiled from numerous writers, and it contains many passages from ancient writers who are lost.

Sui-fu, Hsüchou-fu, or Süchou-fu, a tn. of Süchwan, China, on Yangtse-

kiang, 130 m. S.W. of Chungking. A great trade centre. Pop. 250,000.

Sui Juris (Lat. 'in his own right'), a legal phrase borrowed from the Roman law of emancipation, denoting a person who, not being an infant, lunatic, married woman restrained from anticipation, or otherwise under any legal disability, is legally capable of managing his own affairs, or of suing and being sued in his own right. In the law of trusts where there is only one beneficiary interested in the trust property, and such person is *sui juris*, the trustee's *raison d'être* is gone and the beneficiary can call for a conveyance of the full legal estate.

Suir, a riv. of Ireland, rising in Tipperary, flowing S. past Thurles and Caher, and past Cloumel, Carriick, and Waterford, and uniting with the Barrow to form Waterford Harbour. Length 100 m.

Suite, in music, was the first instrumental form of composition, in which the combination of several parts formed a whole. It was conspicuous in the latter 16th and early 18th centuries, consisting of a series of dances, with a prelude, and maintaining a uniformity of key and rhythm.

Suja, or Sudsha, a tn. of Kursk gov., Central Russia, 54 m. S.W. of Kursk, with mills, distilleries, and numerous manufs. Pop. 13,000.

Sukkur, or Sakkar, a tn. of dist. Shikapur, Sindh, India, on the W. bank of the Indus, opposite Rohri. It is the starting point of the railway traversing the Bolau and Nari passes to Quetta. Pop. 31,000.

Sulaiman, or Suleiman, Hills, a mountain range, 350 m. long, in the N.W. Provinces, India, near the Baluchistan frontier. They trend S.W., almost following the course of the Indus. The highest summit is the Takht-i-Sulaiman, which reaches an alt. of 11,070 ft., but other peaks approximate in height. There are several important passes near the towns of Attock, Sukkur, Dera Ghazi Khan, and Dera Ismail Khan.

Suleiman Pasha (1838-92), a Turkish general. He entered the army in 1854, and became major (1867), colonel and instructor in the military school (1873), sub-director of the military school and general of brigade (1874), general of division (1876), and marshal (1877). He served in Montenegro, Crete (1867), and Yemur; in the Servian campaign (1876); in the Russo-Turkish War, defeating Gurko at Eski-Zaghlra (1877), and losing his army at the Shipka Pass. He was degraded for his defeat at Philippopolis (1878) and imprisoned.

Sulina: 1. The centre one of the three estuarine arms of the Danube, flowing through the Dobrudja.

Length, 50 m.; width, 100 yds.; depth, 15 to 60 ft. 2. Port of Tulcea prov., Dobrudja, Rumania, at mouth of abere. Pop. 7000.

Suliotcs, an Albanian tribe who since the 17th century have lived in Yanina, Epirus. Before being driven here by the Turks they were largely settled in the Ionian Isles, and served in the wars of Greek Independence.

Sulla, the name of a patrician family of the Cornelia gens:

L. Sulla (138-78 B.C.), surnamed *Felix*, the Dictator. He was quaestor in 107, when he served under Marius in Africa, and also with great distinction in the campaigns against the Cimbri and Teutones; but Marius becoming jealous of the rising fame of his officer, S. left Marius in 102, and took a command under the colleague of Marius, Q. Catulus, who entrusted the chief management of the war to S. S. now returned to Rome. He was praetor in 93, and in the following year (92) was sent as propraetor into Cilicia, with special orders from the senate to restore Ariobarzanes to his kingdom of Cappadocia, from which he had been expelled by Mithridates. S. met with complete success. The enmity between Marius and S. now assumed a more deadly form. S.'s ability and increasing reputation had already led the aristocratical party to look up to him as one of their leaders; and thus political animosity was added to private hatred; but the breaking out of the Social War hushed all private quarrels for the time. Marius and S. both took an active part in the war against the common foe, but the achievements of S. threw those of Marius into the shade. S. gained some brilliant victories over the enemy, and took Bovianum, the chief town of the Samnites. He was elected consul for 88, and received from the senate the command of the Mithridatic War. Marius, envious at not having received the command, obtained the expulsion of S., but S. returned to Rome at the head of his legions, which resulted in the proscription of Marius and his leading adherents. S. set out for Greece at the beginning of 87, in order to carry on the war against Mithridates. After driving the generals of Mithridates out of Greece, S. crossed the Hellespont, and early in 84 concluded a peace with the king of Pontus. S. now prepared to return to Italy, where, during his absence, the Marian party had obtained the ascendancy. He landed at Brundisium in the spring of 83. The Marian party far outnumbered him in troops, and had every prospect of victory; however, in the following year (82) the struggle

was brought to a close by the decisive victory gained by S. over the Samnites and Lucanians under Pontius Telesinus before the Collina gate of Rome. This victory was followed by the surrender of Praeneste and the death of the younger Marius. S. was now master of Rome and Italy; and he resolved to take the most ample vengeance upon his enemies, and to extirpate the popular party. One of his first acts was to draw up a list of his enemies who were to be put to death, called a *Proscriptio*. S. had been appointed dictator for as long a time as he judged to be necessary, during which period he endeavoured to restore the power of the aristocracy and senate, and to diminish that of the people. At the beginning of 81 he celebrated a splendid triumph on account of his victory over Mithridates. In order to strengthen his power, S. established military colonies throughout Italy. Twenty-three legions, or, according to another statement, forty-seven legions, received grants of land in various parts of Italy. S. likewise created at Rome a kind of bodyguard for his protection, by giving the citizenship to a great number of slaves who had belonged to persons proscribed by him. After holding the dictatorship till the beginning of 79, S. resigned this office, to the surprise of all classes. He retired to his estate at Puteoli, and there died in the 60th year of his age. (Mommson, *History of Rome*, vol. iv.; Oman, *Seven Roman Statesmen*.)

Faustus Sulla, son of the dictator by his fourth wife, Cecilia Metella, and a twin brother of Fausta, was born not long before 88. Faustus accompanied Pompey into Asia, and was the first who mounted the walls of the Temple of Jerusalem in 63. In 54 he was quaestor. He married Pompey's daughter, and sided with his father-in-law in the Civil War. He was present at the battle of Pharsalia, and subsequently joined the leaders of his party in Africa. After the battle of Thapsus in 46, he attempted to escape into Mauretania, but was taken prisoner by P. Sittius and carried to Caesar. Upon his arrival in Caesar's camp he was murdered by the soldiers in a tumult.

P. Sulla, nephew of the dictator, was elected consul along with P. Autronius Pætus for the year 65, but neither he nor his colleague entered upon the office, as they were accused of bribery by L. Torquatus the younger, and condemned. It was currently believed that S. was privy to both of Catiline's conspiracies. In the Civil War S. espoused Caesar's cause. He served under him as legato in Greece, and commanded

along with Cæsar himself the right wing at the battle of Pharsalia (48). He died in 45.

Sullivan, Sir Arthur Seymour (1842-1900), a composer of operas, son of a Kneller Hall clarinet master. Entered Chapel Royal in 1854, shortly afterwards studying at the Royal Academy under Sterndale Bennett and Goss. His first important work was an overture, written during his student days at Leipzig (1858), where, with Franklin Taylor, Carl Rosa, and J. F. Barnett, he was a pupil at the Conservatoire; his masters included Plaidy, Moscheles, and Richter. As the associate of the late Sir W. S. Gilbert, he wrote many light operas for the Savoy, e.g., *H.M.S. Pinafore* (1878), *Pirates of Penzance* (1880), *Patience* (1881), *Iolanthe* (1882), *Mikado* (1885), *Yeomen of the Guard* (1888), *Gondoliers* (1889). The cantatas *Martyr of Antioch* (1880), *Kenilworth* (1884), and *Golden Legend* (1886), and his grand opera *Ivanhoe* (1891), must also be mentioned.

Sullivan, Barry (1821-91), an actor, of Irish birth. He appeared in Ireland as a professional actor in 1837; in Edinburgh (1841), in Liverpool (1847), in London (1852), in America (1857), and in Australia (1861-66).

Sully, Maximilien de Bethune, Duc de (1559-1641), a French statesman, born at Rosny. In 1572 he was placed by his father, the Baron de Rosny, in the service of Henry, the young king of Navarre. His father died about 1575 and left him entirely his own master. At first Rosny accepted an ensign in the regiment of foot of which his relation Lavardin was colonel, and in this capacity he became remarkable for his intrepidity as he was for his prudence in civil affairs. He was persuaded in 1581 to accompany the Duke of Anjou to the Netherlands; but he returned in 1583 to the king of Navarre, and was almost immediately dispatched to Paris to keep an eye upon the intrigues there going forward. In 1583 he married Anne de Courtney, and spent the whole of 1584 with his young wife at Rosny. Rosny's devotion to the cause of Henry was deep and unalterable. He was employed in many delicate and difficult negotiations; and at the battle of Coutras (1587), where he commanded the small park of artillery, he contributed mainly to the gaining of the victory. The services of Rosny, after the assassination of the French king, Henry III., and until the entry of Henry IV. into Paris (March 1594), were great. He was appointed a member of the great council of finance, 1596. On receiving

the appointment, his first step was to obtain from the king the appointment of a commission of inquiry into the state of the revenue and its collection in all the districts into which the kingdom was divided for financial purposes. He was soon afterwards promoted to be superintendent of finance, and entered upon the discharge of his duties with a zeal that amounted almost to a passion. When he undertook the management of the finances, in 1597, the treasury was empty and in debt; after the death of Henry IV., in 1610, forty-two millions of livres were found in it. His success in this department led to his appointment as grand-master of the artillery, director of the marine, master of works, and director of bridges and highways. He became in fact sole minister of France. In 1606 he was created Duc de Sully and a peer of France. The murder of Henry IV. in 1610 terminated the career of S. as minister. Early in 1611 he gave up the offices of superintendent of finance and governor of the Bastille. He had retained his government of Poitou, and the direction of the artillery, the fortifications, and the roads and bridges; so, though retired from court, his life was neither private nor inactive. He was appointed a marshal of France by Louis XIII. in 1634. The favourite amusement of his declining years consisted in preparing his *Memoirs* 'of the great and royal economies of Henry IV.' for publication. The first two volumes of S.'s *Memoirs* were published in 1634, but without date; the third and fourth volumes in 1662.

Sully-Prudhomme, René François Armand (1839-1907), a French poet, born and educated in Paris, and became a lawyer's assistant. His works, mostly of a philosophical nature, include: *Stances et Poèmes*, 1865; *Les Épreuves*, 1866; *Les Solitudes*, 1869; *Les Destins*, 1872; *Les Vaines Tendresses*, 1875; *La Justice*, 1878; *Le Bonheur*, 1888; *L'Expression dans les Beaux Arts*; *Réflexions sur l'Art des Vers*, 1892; a metrical translation of the *De Rerum Natura* of Lucretius; and *Étude sur Pascal*. He was elected to the Academy in 1881. His best work is marked by a severe beauty of form and a serene melancholy of thought, and often shows great intellectual power.

Sulphonal, $(\text{CH}_3)_2\text{C}(\text{SO}_2\text{C}_2\text{H}_5)_2$, is prepared by condensing acetone with ethyl mercaptan in the presence of hydrochloric acid, and oxidising the resulting mercaptole with permanganate. It forms colourless crystals (melting point 126°) slightly soluble in water, and is used largely as a hypnotic or soporific (dose 15-45 grains).

Sulphur (S. 32), a non-metallic element which occurs in the free state chiefly in volcanic districts, e.g. Italy and Sicily, Iceland, Japan, and U.S.A. In combination with other elements sulphur is widely distributed, occurring in the sulphates gypsum (CaSO_4), heavy spar (BaSO_4), and Epsom salts (MgSO_4), and also in the sulphides of zinc (blende), lead (galena), antimony (stibnite), and in pyrites. To free natural sulphur from earthy impurities it is stacked in brick kilns having a sloping floor and ignited with burning brushwood. Some sulphur burns and the heat of its combustion causes the remainder to melt and flow away from the impurities into rough moulds. About one-third of the total sulphur present is wasted by this method. Pyrites is sometimes burned in order to obtain sulphur, but more generally the pyrites is roasted with excess of air to obtain sulphur dioxide for the sulphuric acid manufacture. A great source of the supply of sulphur is the alkali-maker's waste (see ALKALI). The sulphur is obtained from this material by Chance's process, which consists in decomposing the moist waste with lime-kiln gases (carbon dioxide). Carbonate of lime and hydrogen sulphide are the ultimate products of the reaction, the latter of which is either burned with excess of air to sulphur dioxide and used in the sulphuric acid manufacture, or burned with a limited supply of air and the sulphur obtained in the free state. The crude sulphur thus obtained is purified by distillation from iron retorts into brickwork chambers. In these chambers the sulphur condenses and forms a powdery deposit, the 'flowers of sulphur' of commerce. As the distillation goes on the temperature rises, the powder melting to an amber-coloured liquid which is run out into wooden moulds, forming the well-known 'roll sulphur.' Sulphur exists in four allotropic modifications, viz., octahedral, prismatic, plastic, and amorphous. Native sulphur is octahedral, and is a pale yellow solid, soluble in carbon disulphide and in benzene, turpentine, etc. It is an extremely bad conductor of electricity and heat. At 114.5°C . sulphur melts to an amber-coloured mobile liquid. When the temperature is further raised, the liquid changes in colour and becomes more until at 230°C . the liquid appears almost black and cannot be poured from the vessel. Further rise of temperature causes the liquid to regain its mobility, and at 448° it boils to a brownish vapour. Prismatic sulphur is obtained when melted sulphur is allowed to cool under ordinary con-

ditions, or when crystallised from a hot solution in oil of turpentine. It forms monoclinic crystals which melt at 120°C . Prismatic sulphur is not stable, but slowly passes to the rhombic form at ordinary temperatures. Plastic sulphur is formed when melted sulphur is poured into water. It is tough and elastic and insoluble in carbon disulphide, but is unstable and in a few days passes to the rhombic state. The amorphous variety of sulphur is insoluble in carbon disulphide.

'Flowers of sulphur' is mostly the octahedral or rhombic variety, although some amorphous sulphur is present. 'Milk of sulphur' used in medicine is produced by the action of hydrochloric acid on polysulphide of lime. Sulphur burns easily in air, forming sulphur dioxide. It combines directly with many metals and non-metals, forming sulphides, e.g., iron and copper burn brightly in sulphur vapour. Sulphur is used as an insulator in pyrotechnics and in medicine as an aperient. A few of the more important simple compounds of sulphur are the following: Hydrogen sulphide or sulphuretted hydrogen (H_2S) is a gas which escapes from volcanoes, and is also found in some mineral waters which are reputed cures for rheumatism and some skin diseases. It is commonly prepared by the action of dilute hydrochloric acid on ferrous sulphide in a Kipp generator ($\text{FeS} + 2\text{HCl} = \text{H}_2\text{S} + \text{FeCl}_2$). Hydrogen sulphide is a colourless, poisonous gas, with a smell like rotten eggs. It is fairly soluble in water, its solution being slightly acid to litmus. It burns in air with a lilac flame, forming sulphur dioxide, water, and free sulphur. Its value in the laboratory is as a reducing agent and on account of the fact that it precipitates the sulphides of certain metals from solution. The gas is absorbed by lime, with the formation of calcium hydrosulphide, and also by calcium sulphide (see Chance's process above).

Sulphur dioxide, sulphurous anhydride (SO_2), is a gas met with in the emanations from volcanoes, and is formed wherever sulphur or its compounds are burned in air. For the preparation of sulphuric acid, sul-

phur is prepared by roasting pyrites: $4\text{FeS}_2 + 11\text{O}_2 = 2\text{Fe}_2\text{O}_3 + 8\text{SO}_2$. The laboratory method of preparing sulphuric acid is heating copper turnings with sulphuric acid, when the gas is evolved: $\text{Cu} + 2\text{H}_2\text{SO}_4 = \text{CuSO}_4 + \text{SO}_2 + 2\text{H}_2\text{O}$. Sulphur dioxide is a colourless gas with a suffocating smell, and is very soluble in water (1 vol. of water at 0°C . dissolving 80

vols. of gas), forming an acid solution (see SULPHUROUS ACID). The gas is easily liquefied (at -10° under ordinary pressure) and is thus supplied in that condition in syphons. The liquid is used as a refrigerator, low temperatures being produced by its rapid evaporation. The solution of the gas in water is used as a reducing agent and for bleaching straw and wool. Sulphur dioxide is used as a disinfectant and as an 'antichlor' to remove last traces of chlorine from articles bleached with the latter.

Sulphur trioxide, sulphuric anhydride (SO_3), is produced when a mixture of oxygen and sulphur dioxide is passed over heated platinised asbestos, or it may be conveniently prepared by gently distilling pyrosulphuric acid. It is a white crystalline solid (melting point $15^{\circ}\text{C}.$) which fumes in contact with air and combines violently with water to form sulphuric acid.

Sulphuric Acid, Hydrogen Sulphate, or Oil of Vitriol (H_2SO_4), is formed when sulphur trioxide is dissolved in water. Commercially the acid is formed by two processes—the 'Chamber' and the 'Contact' processes.

Chamber process.—This depends upon the formation of sulphur trioxide from the dioxide and the subsequent solution of the former in water. Sulphur dioxide does not become oxidised to the trioxide without the aid of a catalytic agent. When sulphur dioxide and oxygen are mixed with nitrogen peroxide in the presence of steam a series of reactions takes place resulting in the formation of sulphuric acid. The sulphur dioxide, nitrogen peroxide, and water give rise to the formation of nitrosulphonic acid and a molecule of nitric oxide: $2\text{SO}_2 + 3\text{NO}_2 + \text{H}_2\text{O} = 2\text{H}(\text{NO})\text{SO}_3 + \text{NO}$. This nitrosulphonic acid forms white crystals which are decomposed in the presence of water to sulphuric acid and a mixture of nitric oxide and nitrogen peroxide: $2\text{SO}_2(\text{HO})(\text{NO}) + \text{H}_2\text{O} = 2\text{H}_2\text{SO}_4 + \text{NO} + \text{NO}_2$. The nitric oxide coming in contact with atmospheric oxygen is reconverted to the peroxide. These reactions form the basis of the chamber process of the sulphuric acid manufacture. In the process the nitrosulphonic acid (chamber-crystals) is not actually isolated unless the supply of water is accidentally deficient. The sulphuric acid plant consists of four main parts, viz.: Apparatus for (1) producing sulphur dioxide; (2) for the production of oxides of nitrogen, and (3) for the absorption of oxides of nitrogen from the gases leaving the chambers, and, lastly, the chambers

in which the reactions take place. The sulphur dioxide is produced by burning sulphur or more generally by roasting pyrites in kilns with a regulated supply of air. The supply of nitrogen peroxide requires to be replenished owing to loss, the gas being generated by the action of sulphuric acid on nitre contained in earthenware pots and placed in the flue of the pyrites burners. Three to four parts of nitre are required for every 100 parts of sulphur burnt as pyrites. For the absorption of the nitrogen peroxide from the chamber gases, the Gay-Lussac tower is employed. This consists of a square leaden tower filled with coke fragments and down which a stream of cold strong sulphuric acid percolates. Nitro-sulphonic acid is formed by the absorption of the peroxide, and this is then pumped to the top of the 'Glover' tower which is filled with flint fragments. Down this tower it is allowed to percolate, and the descending stream meets with the hot gases from the pyrites burners which pass upwards to the first chamber. Denitrification takes place, sulphuric acid being re-formed and nitric oxide liberated, and this is swept into the chambers with the other gases. A quantity of chamber acid is also allowed to flow down the Glover tower where, meeting the hot gases, it becomes partially concentrated. The chambers into which the gases are led are made of sheet lead joined up by autogenous soldering. The order of the process then is the following: The gases from the pyrites burners are led through the Glover tower, where they effect the denitrification of nitro-sulphonic acid, and then pass to the chambers, where they meet the necessary supply of steam. Sulphuric acid collects in the chambers and is withdrawn when it reaches a specific gravity of 1.6, otherwise the leaden chambers are corroded. Finally, after passing through the chambers, the gases are passed up the Gay-Lussac tower, where the nitrogen peroxide is absorbed, and returned to the chambers through the intervention of the Glover tower as explained above. The acid if so required is further concentrated in leaden pans, or if a high degree of concentration is wanted, in glass or platinum vessels. Impurities, such as lead sulphate, arsenic, and oxides of nitrogen, are generally present in the acid. The arsenic is removed by precipitation as the sulphide and other impurities are got rid of by distilling the acid after addition of ammonium sulphate.

Contact process.—A mixture of sulphur dioxide and air from the pyrites burners is passed into a 'dust-

chamber' into which jets of steam are injected. Being now freed from dust and sufficiently cooled, the gases are passed through a series of towers where they meet a descending spray of water, and after this washing are dried by passing up towers down which concentrated sulphuric acid percolates. The pure gas admitted to the contact which contains platinised ferric oxide on perforated plates. The operation is started by gentle heating, but once started, sufficient heat is generated by the reaction, and care is taken to prevent the temperature from rising above 350° C. Sulphur trioxide is formed and is dissolved in water, forming sulphuric acid.

Sulphuric acid is a colourless, oily liquid (sp. gr. 1.8) which has a great affinity for water. The strongest acid contains about 2 per cent. water, and on cooling to 0° C. this acid forms colourless crystals which melt at 10.5° C. On account of its powerful affinity for water, the acid is used as a desiccating agent. If the acid is poured on wood or sugar the elements of water are withdrawn and carbon left. The mixing of the acid with water is accompanied by a great evolution of heat, hence care must be taken when mixing, otherwise explosive ebullition takes place. Sulphuric acid is used in the Leblanc process for carbonate of soda, in galvanising, in tinplate and in aerated water industries. The acid is dibasic, forming both normal and acid salts. Of the normal salts, several occur in nature, viz., barytes (BaSO_4) and Epsom salts (MgSO_4).

The sulphates are mostly soluble in water, those of lead, calcium, and strontium are only sparingly soluble, while barium sulphate is insoluble in water and in acids. This last salt is, therefore, used as a test for the presence of the acid. Addition of a soluble barium salt to a sulphate is followed immediately by the precipitation of the insoluble barium sulphate. The acid salts are similar in properties to the normal salts, but have an acid reaction. The alums are a well-known group of double sulphates (see ALUM).

Pyrosulphuric, Nordhansen, or fuming sulphuric acid is obtained by dissolving sulphur trioxide in sulphuric acid, but is prepared by the distillation of ferrous sulphate in clay retorts. It is a colourless, strongly fuming liquid (sp. gr. 1.88) and solidifies on cooling to a crystalline mass (melting point 35° C.). It forms a stable series of salts known as the disulphates.

Sulphuric Ether, see ETHER.

Sulphurous Acid is known only in solution and in its hydrates, and consists of a solution of sulphur dioxide in water ($\text{SO}_2 + \text{H}_2\text{O} = \text{H}_2\text{SO}_3$). Several hydrates with six, ten, and fourteen molecules of water are known. The solution smells strongly

of sulphur dioxide and gradually forms two series of salts.

Sulphites prepared by the action of excess of hydroxide or carbonate of the metal upon the acid, e.g., sodium sulphite (Na_2SO_3). (2) Acid sulphites such as potassium hydrogen sulphite (KHSO_3), which is prepared by having excess of acid acting on the hydroxide. The alkaline sulphites are soluble in water, the sulphites of other metals being insoluble or nearly so. The metabisulphites (e.g., $\text{K}_2\text{S}_2\text{O}_5$) and the bisulphites are also derivatives of the acid and are used in photography. Chemically the sulphites and the acid are reducing agents.

Sulpicia, the name of two Roman poetesses: 1. Niece of Messalla, lived in reign of Augustus and wrote elegiac poems addressed to Ceanthus. 2. Lived in reign of Domitianus and wrote a volume of poems dealing with her husband Calpurnus.

Sulpicians, an order of priests in the Roman Church founded in 1645 for training candidates for the priesthood. It receives its name from the Church of St. Sulpice in Paris.

Sulpicius, Publius Rufus (121-88 B.C.), a Roman orator and statesman. In 89 he was legate to Strabo in the Social War, and in 88 tribune of the plebs, and soon afterwards declared for the popular party and attempted to obtain the command in the Mithridatic War for Marius. His franchise bill to this end met with the opposition of the senate, and S. and Marius stirred up riots till the bill was passed. Immediately Sulla marched on Rome and S. was beheaded.

Sulpicius, Servius (surnamed Lemonia), a contemporary and friend of Cicero. He became one of the best jurists as well as most eloquent orators of his age. He appears to have espoused Caesar's side in the Civil War, and was appointed by Caesar pro-consul of Achaia (46 or 45). He died in 43 in the camp of M. Antony, having been sent by the senate on a mission to Antony, who was besieging Dec. Brutus in Mutina. S. wrote a great number of legal works.

Sulpicius, Severus (363-410), a Christian ecclesiastical historian, born in Aquitaine. He was a friend of St. Martin, Bishop of Tours, and wrote his life and *Historia Sacra* from the creation.

Sultan, a Mohammedan title of

dignity borne by numerous Eastern and African rulers; e.g., those of Turkey and Morocco. The former is the 'Sultan of sultans' or 'Padishah.'

Sultanpur: 1. The cap. of Sultanpur dist., United Provinces, India, 60 m. N.E. of Allahabad. Pop. 10,000. 2. A tn. of Gurgaon dist., Punjab, India, 30 m. S.E. of Amritsar, with salt works. 3. A tn. of Darbhanga dist., Bengal, India, 35 m. N.E. of Patna. 4. A tn. of Karpurthala state, Punjab, India. Pop. 9000. 5. A tn. of Kangra dist., Punjab, 60 m. N.W. of Simla.

Sulu (Sooloo, Yolo, or Jolo) Archipelago, a group of the Eastern Archipelago, having the Sulu Sea on the N.W., the Sea of Celebes on the S.E. There are about 190 islands, divided into six groups. Total area about 1550 sq. m. They belong to the U.S.A.

Sulu Sea, or Sea of Mindero, sea of Pacific Ocean, lying between lat. 5° N. and 12° N. and long. 117° E. and 123° E. N.E. are the Visaya Islands; S.W., Borneo; N.W., Paragua; and S.E., Mindanao and the Sulu Islands.

Sulzbach: 1. A tn. of Upper Palatinate, Bavaria, Germany, 30 m. S.E. of Bayreuth, in mining dist. Pop. 5480. 2. A com. of Rhenish Prussia, 5 m. N.E. of Saarbrücken. Pop. 22,433.

Sulzer, Johann Georg (1720-79), a Swiss philosopher, born at Winterthur; educated at Zürich. In 1742 he went to Berlin, where he met Euler and Maupertuis, and became professor at the Joachimsthaler Gymnasium (1747) and the Ritterakademie (1763). His works include *Allgemeine Theorie der schönen Künste*, and *Nachträge, oder Charakteristik der vornehmsten Dichter aller Nationen*.

Sumach, **Sumac**, and **Shumack** are names given to *Rhus Coraria*, a species of Anacardiaceæ found in S. Europe. Its leaves when ground are used in dyeing and tanning. The West Indian S. is a species of *Brunellia*.

Sumarokov, Alexander Petrovitch (1718-77), a Russian dramatist, born in Finland and served in army. He was made director of the first permanent theatre at St. Petersburg in 1756, and staged his works there and at Moscow.

Sumatra, a large island of the Dutch E. Indies, lying W. of Borneo and S.W. of the Malay Peninsula, trending from N.W. to S.E., its W. shores being washed by the Indian Ocean. It is divided into six districts—West S., East S., Benkoelen, Lampongs, Palembang, and Atchin or Atjeh—its area amounting to 161,612 sq. m., and its pop. to 3,200,000, mainly Malays. Its surface is mountainous, especially

near the W. coasts, where there are several volcanic peaks which rise to an altitude of nearly 10,000 ft. The country is watered by numerous rivers, the Musi and Jambi (both navigable for between 400 m. and 500 m. respectively) being the chief. Numerous islands surround the coast, the largest being Banka Is. in the S.W. Parts of the island are densely forested, vegetation is luxuriant, and the climate is tropical. In the north of S., near Atchin, coal is mined and petroleum extracted. Gold, copper, iron, sulphur, and saltpetre are also found. Other products include pepper, nutmegs, spices, sago, millet, cocoa, coffee, betel-nuts, and rice, which are all extensively grown. Wild animals abound, the birds are in great variety, and insect pests swarm. The equator divides the island into two almost equal parts. S. was visited by the Portuguese in 1509, and by the Dutch and English a century later. In 1825 the English possessions were ceded to the Dutch in exchange for Malacca. See Breitenstein's *Sumatra*, 1902.

Sumbawa, one of the Lesser Sunda Islands, Malay Archipelago, separated on the W. from Lombok by the Strait of Allas and on the E. from Komodo by Sapi Strait. Area 4300 sq. m.; length 160 m.; breadth 20 to 60 m. On the N.E. is Tamboro (9000 ft.), a destructive volcano. Under Dutch protection.

Sumbul, an E. Indian name applied to two plants which have fragrant roots. One of these, known also as musk-root, is *Ferula sumbul*, and is a species of Umbellifera; the other is *Nardostachys Jatamansi*, the spike-nard, a species of Valerianaceæ.

Sumir, a prov. of Babylonia (q.v.). **Sumiswald**, a com. of Switzerland, in the canton of Berne, 15 m. E.N.E. therefrom. There are manufs. of linen and cheese. Pop. 5563.

Summary Jurisdiction. The S. J. of justices of the peace is a power conferred on justices by various Acts of Parliament to try certain minor offences without the aid of a jury and to make orders for payment of money on *complaint*. Generally speaking, S. J. is confined to matters occurring within the county borough or other district for which the justice has been appointed in the commission of the peace, or within 500 yards of the boundary of such district, or upon a vehicle or vessel whilst on a journey through the jurisdiction. The procedure is regulated by the Summary Jurisdiction Acts, 1848 and 1879, and subsequent amending Acts. See JUSTICES OF THE PEACE, and POLICE.

Summer, that portion of the year when the part of the earth in question

is nearest to the sun and thus has its highest temperature. In the northern hemisphere S. lasts from the ontry of the sun into the zodiacal sign of Cancer, about June 22. till the autumnal equinox of Sept. 21. The S. of the southern hemisphere corresponds to the northern winter.

Summer Isles, a group of islands at the N. entrance of Loch Broom, Scotland. The largest is Tanera More, which also is the only one inhabited.

Summerside, a seaport of P. Edward Is., Canada, the cap. of Prince co., on Bedouque Bay. Prince Edward Island R., 40 m. N. of Charlottetown, with an excellent harbour, and flour and saw-mills. Pop. 3000.

Summit, a city of Union co., New Jersey, U.S.A., on Lackawanna R., 11 m. S.W. of Newark. It forms a kind of residential suburb of New York and is a summer resort. Pop. (1910) 7500.

Summons, in law, a citation to appear in court. It is a written notification, signed by the proper officer, to be served on a person warning him to appear on a specified day to answer the claim of the plaintiff. In the High Court procedure a writ of S. is the initial document of a common law action. It contains *inter alia* an indorsement of the nature of the claim made, or of the relief or remedy required in the action, so that the defendant may know why he is sued. In some cases the plaintiff is allowed to state the particulars of his case *in full detail*, but the use of such *specialty indorsed writs* of S., which take the place of a statement of claim, is only permitted in some half-dozen specified cases of liquidated demands (Order XIV. of the Rules of the Supreme Court). An *originating S.* is a document by which any person claiming to be interested under a deed, will, or other written instrument, may apply to the court for the determination of any question of construction or interpretation arising under the instrument and for a declaration of his rights. It is the customary mode of commencing numerous actions in the Chancery Division. The issue of a *default S.* in the county court is the ordinary mode of commencing an action for the recovery of a debt in that court. A *judgment S.* is issued to enforce a judgment debt under pain of committal.

Sumner, Charles (1811-74), an American statesman, was born at Boston, and educated there and at Harvard, being called to the bar in 1834. After travelling on the Continent from 1837-40 he took an active part in politics on his return, being noted as a determined opponent of

slavery. In 1851 he was elected to the senate, and continued his opposition; in 1856 he was assaulted by Preston Brooks and incapacitated for three years. His works, in fifteen volumes, were published 1870-83. See *Memoirs* (1877) by Pierce.

Sumner, Charles Richard (1790-1874), an English churchman, was private chaplain to George IV. at Windsor. Later he became Bishop of

work was
Thrist practi-
See Life
876.

Sumner, John Bird (1780-1862), Archbishop of Canterbury, was educated at Cambridge. In 1818 he became rector of Mapledurham, in 1828 Bishop of Chester, and twenty years later was appointed to the see of

his works are:
A Treatise
on and
the Creator,
Christianity
Reception,

1824.

Sumptuary Laws (Lat. *sumptuarius*, from *sumptus*, expense). S. L. or regulations were such as restrained or limited the expenses of citizens in wearing apparel, equipages, the pleasures of the table, furniture, etc. Such laws were in former times frequently enacted both in England and in Scotland, but have been in desuetude for centuries. Those of England were repealed in 1601 by one of the first Acts of the reign of James I.

Sumter, a city of S. Carolina, U.S.A., and cap. of Sumter co., 81 m. N.W. of Charleston. It is a trade centre for an agricultural region, and export-cotton and tobacco. It was founded in 1800, and named after General Sumter. Pop. (1910) 8109.

Sumter, Fort, see FORT SUMTER.

Sunny, a tn. of S. Russia, in the gov. of Kharkov, 83 m. N.W. of the city of Kharkov. It is a trade centre for the Ukraine, and has manufs. of sugar. Pop. 28,000.

Sun, The, the parent body of the solar system, the star to which the visible planets belong, has a mean parallax of about $8.796''$, corresponding to a mean distance of 92.93 million miles; its angular diameter is $1920'' \pm 0.03''$, corresponding to 865,000 m.; its mass 332,800 times that of the earth. Taking the weight of the earth at 1.317×10^{25} lbs. (Burgess), that of the S. is 4.38×10^{30} lbs. The volume of the S. being 1,306,000 times, its density is only 0.255 times that of the earth, or 1.41 sp. gr. The S.'s surface gravitational attraction is 27.6 times greater

than terrestrial surface gravitation. Its equator is inclined to the ecliptic at an angle of $7^{\circ} 15'$, to the plane of the earth's equator at $26^{\circ} 15'$; its axis points midway between Vega and the Pole Star, R.A. 18 hrs. 44 mins., decl. 61° . *Rotation*.—The density of the S. indicates a gaseous state, and rotation is therefore of a different class from that of the earth. Carrington and Spörer from observations of sun-spots gave about twenty-five days as the period for equatorial rotation. The former expressed his result by the equation $X = 865' - 165' \sin^2 l$, where X = daily rate, l = latitude. Similar results have been obtained by Stratonoff and Chevallier from measurements of facule. Fox and Hale have made determinations from spectroheliographs of hydrogen and calcium flocculi, but the line H δ gave no retardation for higher latitudes. Duner, Hahn, and Adams have made researches on various spectral lines, utilising the Doppler effect, since one side of the S.'s disc will show approach, the other recession. The result (Adams) is 24.6 days at the equator, 26.3 days at 30° lat., 31.2 days at 60° lat., 35.3 days at 80° lat.; his equation being $\zeta = 10.62^{\circ} + 3.99^{\circ} \cos^2 \phi$, ζ = angular sidereal rotation per day, ϕ = latitude. So far as it has been possible to classify the phenomena which compose the S., they may be grouped under five heads; the photosphere (*q.v.*), the reversing layer, the chromosphere (*q.v.*), and the corona; beyond these is the general question of radiation. *Reversing layer*.—Kirchhoff's theory regarding the dark lines in the solar spectrum supposed a layer of gaseous matter, through which light from the photosphere must pass to reach the earth. At the temperature of the S., this would be incandescent, and would give a bright line spectrum if separately observed. This was accomplished in the total eclipse of 1870 by Professor Young. At the moment of totality, the light of the photosphere being obscured, the bright lines forming the spectrum of the reversing layer were visible as a 'flash spectrum.' Metallic lines are numerous, and the layer, which is continuous with the chromosphere, has a thickness estimated variously at 500 to 1000 m. *Corona*.—So far only visible during the few seconds of totality during an eclipse, this extends irregularly for a distance of one or possibly two diameters of the S. beyond the moon's disc. Its spectrum is more nearly continuous than that of the photosphere, with a few bright lines, notably the green 5303 of 'coronium' not yet discovered on the earth. Its rotation with the S. has been confined spectro-

scopically. There appear to be rays of incandescence, reflection, particularly from its outer part, and luminescence; its likeness to the aurora has led to theories of electrical constitution. Comets pass through the substance with no measurable resistance. It appears as a series of radial streamers, 'pearly lined,' emanating from the S., and varies with the sun-spots, a period of eleven years having been estimated. At sun-spot minimum, the equatorial streamers are long, at maximum the rays are of shorter length and more evenly distributed round the S. *Radiation*.—The quantity of sunlight has been estimated at 1575×10^{24} candle-power; its intensity is given as 150 times that of the line-light. Yet were the S. deprived of its absorbing envelope of gases, it would shine with 2.5 times its present power, and would appear blue, those rays being most absorbed. The light of the S. distinctly fades towards the limb, the outer portions passing through a greater thickness of absorbing envelope. The temperature of the photosphere has been estimated to exceed 5860° C. abs., or even 6260° C. abs., while it may reach 7000° C. abs. Young states that the heat received from the S. would be sufficient to melt a layer of ice 226 ft. thick on the earth's equator annually; the energy on each square foot of the earth's surface, if utilised in a perfect heat engine, would be sufficient annually to raise a hundred tons to the height of a mile; at the S.'s surface a thickness of 64 ft. of ice would be melted in one minute. Of the total heat energy of the S., the earth receives $1/22 \times 10^8$. No diminution in the energy of the S. has been detected, and the evidence of plant distribution points to no diminution. Fluctuations in the radiation of the S. have occupied attention with very varying results, but evidences have been obtained at the Smithsonian Observatory on Mt. Wilson. Fig. 1. Illustrates the result; the values being reduced to mean solar distance. An amplitude of change of 3.5 per cent. is frequent, while 10 per cent. is sometimes reached. The figures in the vertical column give the 'solar constant' (but for slightly more correct figures see *Annals*, Smithsonian Astronomical Observatory, vol. III., Figs. 9-14, 1913). The 'solar constant' expresses the total intensity of solar radiation outside the earth's atmosphere at mean solar distance; simultaneous observations in 1909 and 1910 on Mt. Wilson (1 m. high) and Mt. Whitney (3 m. high) gave values in the former case of 1.913-1.904, in the latter 1.979-1.933 calories per sq. cm. per minute. The

distribution of energy throughout the solar spectrum is shown in Fig. 2, which gives two successive bolometric observations on Mt. Wilson through a 60° flint glass prism. At places

doubtful. The halogen group: fluorine, chlorine, bromine, iodine; the oxygen group: oxygen, sulphur, selenium, tellurium; the nitrogen group: nitrogen, phosphorus, arsenic, antimony;

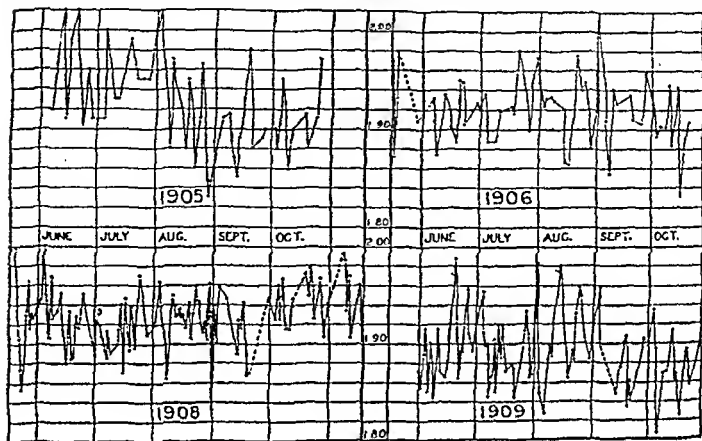


FIG. 1

marked *, the S.'s rays were out off to give a zero radiation base line; at places marked † screens were interposed to reduce intensity to keep the curve on the photographic plate. The heights above the base line are proportional to the energy of the spec-

and boron are absent from the solar spectrum (Rowland). The spectro-heliograph has been applied to the study of the separate lines over the S.'s surface, so that, e.g. iron or calcium or hydrogen 'layers' of the S. are photographed. The three layers

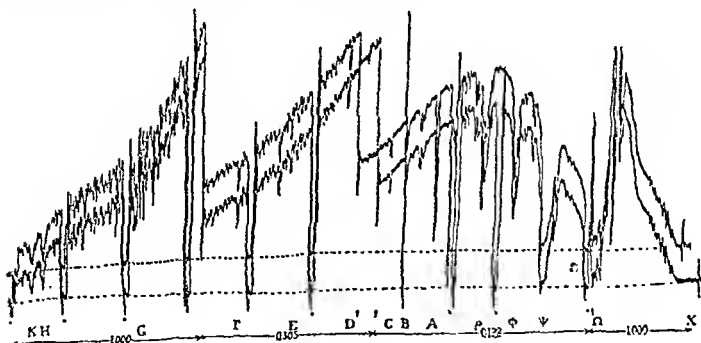


FIG. 2

trum rays. Fraunhofer lines, some of which are indicated by their letters, show as depressions of the curve. The spectrum of the S. has shown the existence there of thirty-six terrestrial elements; twelve others are mentioned and are supposed to be in that order of distance from the S.'s centre. But further, a study of the separate lines of each element gives some idea of the pressure and temperature conditions at different depths within

the S.'s surface. Fig. 3 shows the arrangement of the slit for the observation of spectra of prominences. See C. G. Abbott, S.M., *The Sun*, 1912; Lockyer, *Chemistry of the Sun*, 1887,

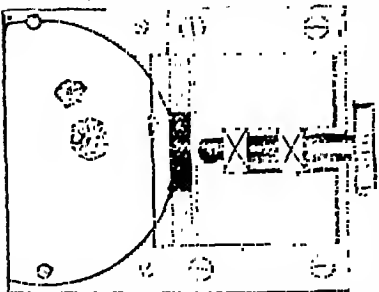


FIG. 3.—METHOD OF OBSERVING THE SUN'S LIMB SPECTROSCOPICALLY

and *The Sun's Place in Nature*, 1897; Ball, *Story of the Sun*, 1893; C. A. Young, *The Sun*. See also SOLAR SYSTEM; CHROMOSPHERE; PHOTO-SPHERE; SPECTRUM, and RADIATION.

Sun Animalcules, see HELIOZOA.

Sunart, Loch, an inlet opening into the Sound of Mull, Argyllshire, Scotland. It is about 20 m. long, with a varying width of $\frac{1}{2}$ to 3 m.

Sun-bear, the *Ursus* (or *Helarctos*) *malayanus*, a small black bear found in Malay.

Sun-birds, the various species of passeriform birds in the family Nectarinidae. They are inhabitants of tropical parts of the Old World, frequenting Africa, India, Papua, and N. Australia. In appearance they are extremely brilliant, shining with metallic colours, and they are of very small size.

Sun-bittern, or *Eurypyga helias*, a galliform bird of the family Eurypygidae, which occurs in the northern part of S. America. It is fairly large, and has a long neck, slender bill, and pervious nostrils; the plumage is mottled, but the chief shades are brown, black, and white. It frequents the marshy banks of large rivers.

Sunbury: 1. A tn. of Pennsylvania, U.S.A., and cap. of Northumberland co., on the Susquehanna R., with an export trade in lumber, and railway works. Pop. (1910) 13,770. 2. A tn. of Victoria, Australia, in Bourke co., 28 m. N.W. of Melbourne. Pop. 2500. 3. A market tn. of Middlesex, England, on the Thames, 17 m. S.W. of London. Pop. (1911) 4607.

Sun-cracks, or Desiccation-cracks, are produced in mud which is exposed to sun and rain. Their existence in strata proves that the surface of the rock on which they lie was exposed

and dried before the next layer of sediment was deposited.

Sunda Islands, in the Malay Archipelago, are situated in the Indian Ocean. They comprise Java, Sumatra, Borneo, Celebes, Banka, etc., among the Great Sunda group, and in the Lesser Sundas are Bali, Lombok, Sumbawa, and Timor, etc.

Sunda Sea, the western extension of the Banda Sea, E. Archipelago, between Flores and Celebes and 120° and 125° E.

Sunday, see SABBATH.

Sunday Island, see RAOUL.

Sunday Schools, in their modern form, owe their origin to Robert Raikes, a printer living in the town of Gloucester, who inaugurated his scheme in 1780. Long before this, however, some kind of Sunday religious instruction had been in use, having been taken over by the early Christians from the Jewish Church. During the middle ages, however, catechising and preaching had fallen largely into disuse, and the mass of the people were very ignorant. Among those who attempted reform by means of Sunday instruction we may mention Luther, Knox, and St. Charles Borromeo. The scheme of Raikes, however, was a larger and more permanent one, and in its initiation he was greatly helped by the Rev. Thomas Stock, to whose suggestions the scheme was indeed due. He proposed to make the S. S. a normal part of the equipment of every church, and the scheme spread rapidly throughout Great Britain, aided as it was by the publicity which Raikes gave it first in the *Gloucester Journal*, and later (1785) in the *Sunday Scholar's Companion*. Paid teachers were at first employed, and reading and writing were taught along with the Bible. But by the end of the 18th century voluntary teachers were found in sufficient numbers to make payment unnecessary. S. S. were introduced into America in 1791, and here they have taken firmer root than anywhere else. In 1817 the Sunday and Adult School Union was formed, and this developed in 1824 into the American Sunday School Union.

Sunday Trading and Sunday Closing. The basis of the law as to Sunday trading is the old Sunday Observance Act, 1677, which provides that 'no tradesman, artificer, workman, labourer, or other person whatsoever (sc. *ejusdem generis*) fourteen years of age or upwards' may 'do or exorcise any worldly labour, business, or work of his ordinary calling upon the Lord's Day,' works of necessity or charity alone being excepted. 'Tradesman' in the above context means one who carries on the business

of buying and selling, so that barbers are not bound to close on Sundays (Palmer v. Snow, 1900), and apparently farmers are outside the Act (R. v. Silvester). By the Bread Act, 1836, making bread or cakes on Sunday or, after 1.30 P.M., selling the same, is punishable by fine. Places of entertainment or amusement are affected by the Sunday Observance Act of 1780, which Act renders the 'chairman of the entertainment,' 'manager,' 'conductor,' 'keeper of the house,' or 'master of the ceremonies' liable to penalties for opening or using a place for entertainment on Sunday where the public are admitted by payment of money, but the effect of this Act is largely nullified by the decision in

quarium Com-
that the simple
public free and
charging only for reserved seats took
the case outside the Act.

Sunder, Lucas, see CRANACH, LUCAS.
Sunderbans, or Sunderbunds, the name given to the jungle region of swamps and islands in the southern part of the deltas of the Ganges and Brahmaputra. The name is derived from the Sunder which furnish portion of the grown.

Sunderland, a seaport and co. bor. of Durham, England, at mouth of R. Wear, 14 m. N.E. of Durham. Included in the municipal borough are Monkwearmouth and Bishopwearmouth. The town is well built, and for the most part modern. St. Peter's Church has portions dating from the 7th century. S. owes its present importance to the rich coal mines in the vicinity. The Pemberton mine (2286 ft. deep) is the deepest in the world. There is an excellent harbour (area 150 acres), and wet docks and tidal basins. There are large ship-building yards and fisheries, iron works, and manufs. of glass, earthenware, machinery, ropes and chains, anchors, chemicals, etc. Pop. (1911) 151,159.

Sunderland, Charles Spencer, Earl of (1674-1722), a statesman, bibliophile. Entered Parliament for Tiverton as a Whig, 1695; succeeded to the title, 1702. In 1700 he gained the support of Marlborough by marrying his daughter. He served on political missions to Vienna and Berlin, 1705; became Secretary of State, 1706, but was dismissed in 1710; became Lord Privy Seal, 1715, after serving as lord-lieutenant of Ireland, and during 1718-21 was First Lord of the Treasury.

Sunderland, Robert Spencer, second Earl of (1640-1702), born at Paris.

In 1671-72 he was employed by Charles II. on embassies to Madrid and Paris. He renounced Protestantism in 1687, but was obliged to flee to Rotterdam in 1688, became again a Protestant and entered the service of William of Orange, who as William III. made him Lord Chamberlain in 1697.

Sundew, or *Drosera rotundifolia*, a species of *Droseraceae* found in bogs and noted as an insectivorous plant (q.v.).

Sundials are instruments for giving the time of the day by means of a shadow cast by the sun. There is the dial on which the hours are marked which receives the shadow, and a style or gnomon from which the shadow is cast. The simplest form is obtained by a gnomon fixed, parallel to the earth's axis, on a dial parallel to the equator; mid-day is marked where the meridian of the place emerges from the dial, and the hours are equally distributed round its circumference. Most S., however, have horizontal or vertical dials fixed on pedestals or the walls of buildings, and on these the hours are unequally distributed. To place the divisions on a horizontal dial for a particular latitude, a globe with the twenty-four meridional spaces may be taken, and a strip of paper passed round the great circle passing through the point of latitude; the points of intersection of the meridians on the paper may be marked and transferred to the dial. The gnomon must be fixed, a triangular plate is bent with one edge acting as gnomon, at an angle to the dial equal to the latitude, and lying in the plane of the meridian. Or the divisions may be calculated from the formula $\tan H = \tan h \times \sin l$, where H is the hour-line, the angle between the hour-line and the meridian; h, the hour angle, the angle described by the sun between the given time and noon; l, the latitude. Time.—The dial gives true solar time and correction is necessary; see DAY and EQUATION OF TIME. The forms of S.

Lectures (Brewster's ed.).

Sundsvall, a seaport of Sweden in the prov. of ... on the coast, on a w m. S.W. of ... sheltered ... sawmills, steel ...

breweries, are the chief industries, and a trade is carried on in timber and fish. Since 1888, when it was almost entirely destroyed by fire, it has been rebuilt, and is now a handsome city. Pop. 16,855.

Sun-fish, the term applied to all members of the perch-like family Centrarchidæ, as well as to several species in other families. Those of the Centrarchidæ are small, oval in shape, bright of colour, and inhabit the fresh water of N. America. Most of them build nests; in diet they are carnivorous, and they themselves serve as food for man. Other S. are *Orthogoriscus* (or *Mola*) *mola* and *Ranzania truncata*, both large species of Molidae in the sub-order Plectognathi; *Selache maximus*, a mackerel-shark of great size; and *Lampris luna*, the opah, a species of Lamprididæ.

Sunflower, or *Helianthus annuus*, a species of Compositæ found in America and cultivated in Britain for its large heads of golden florets. In the United States the seeds, which are oily, are used as poultry-food and as medicine for horses.

Sungari, **Songari**, or **Sunghwakiang**, a large river of Manchuria, rising near the Korean frontier, in the Shan-alin Mts., and flowing N.W. to join the R. Naun and then N.E. to join the R. Amur, in about 47° 38' N., 135 m. S.W. of the influx of the Ussuri. Its total length is about 850 m., and it is navigable up to Kirin and sometimes further. The river is deep (12-20 ft.) in most places, but occasionally spreads out to a width of a mile, when the depth is only 3-4 ft.

Sungei Vjong was formerly a state, but is now (since 1895) part of Negri Sembilan, a British protectorate at the western extremity of the Malay Peninsula. The Malays are agricultural, the tin mines being worked by the Chinese. Area 1860 sq. m. Pop. 30,000, mostly Chinese.

Sunium (*Σουνιον*), the ancient Greek name for the headland, now called Cape Colonna, at the extremo S. of Attica. The ruins of a temple to Poseidon, which crown it, are still a landmark to sailors.

Sunn, or **Sunn-hemp**, a fibre obtained from the stems of *Crotalaria juncea*, a leguminous plant of the E. Indies.

Sunnites, the orthodox section of the Mohammedans. The division among Moslems came on the death of Mohammed, since the Prophet had appointed no successor. The S. take their name from the *Sunna*, a collection of rules, regulations, legends, and sayings of Mohammed, which contain the basis of Mohammedan law, as supplied

mentary to the Koran. The contents of the *Sunna* are, however, much inferior in value.

Sunshine Recorders are instruments for recording the time during which the sun is not obscured by cloud, fog, etc. That recommended by the meteorological authorities of Britain is the 'Campbell-Stokes,' devised by Campbell in 1857 and improved by Prof. Stokes (1879). The simplest pattern for use in a particular latitude has a glass globe which acts as a lens, the sun's image being received on a card in the zodiacal frame. The card is accurately marked in hours and fractions, and the concentrated rays burn a trace as the sun travels across the sky, the breaks showing the periods of obscured sun. Three grooves are provided to receive the cards, one each for winter, summer, and the equinoxes. The Jordan S. R., with the aperture in a closed cylinder, admits the sun's rays to a strip of photographic paper, graduated for time; the trace is fixed by simple rinsing in water, and this must be done, according to the recommendations of the Royal Meteorological Society, before tabulating results. The photographic record gives some measure of the intensity of the sun's rays. In another form of the Jordan S. R. two hemispheres are arranged, one each for morning and afternoon sun. By adjustment in a quadrant on which latitude is shown, these instruments are adjustable for any latitude. For more accurate determinations of the sun's radiation platinum resistance thermometers, or thermo-electric couples, are used and are easily rendered self-registering. The *Denis* S. R. is a self-registering instrument depending on the different absorptive powers of a glass and black surface. A pivoted bent tube containing mercury has one end blackened and contains also some ether. The blackened surface being more absorptive of heat rays, causes the ether to expand and displace the mercury which causes the tube to tilt over and complete the circuit of an electric current from a battery communicating with the registering apparatus. On the sun becoming obscured, the ether cools down and the mercury resumes its original position, causing the tube to tilt back, thus breaking contact. S. Rs. do not give a record of cloudiness, which is usually visually estimated, though at night some indication is given by the Pole Star Recorder (*q.v.*). See Curtis *Quart. Jour. Roy. Met. Soc.* xlv., 1898, 'Sunshine Recorders and Their Indications'; also Symons, *Met. Mag.* vol. xlii., p. 148.

months. Spots have a small proper motion of their own apart from the sun's rotation, and any change of structure appears to be accompanied by a westward rush. *Spectrum*.—This is generally weaker than that of the photosphere, particularly in the violet, a result at least partly due to diminished temperature. Adams, a strengthening of the line of sodium, calcium, vanadium, and chromium (partly), and a distinct weakening of all the hydrogen and silicon lines; but in the total Fraunhofer lines a strengthening; this points to a coolness of the reversing layer just above the spots. A further evidence of such cooling is the presence of the flutings due to titanium oxide and the hydrides of calcium and magnesium. The work of Hale from 1908, from a study of the Zeeman effect in the lines, showed that S. are not of the same polarity, double spots often being of opposite polarity, which is considered to indicate the presence of vortices or whirling motions within the spots.

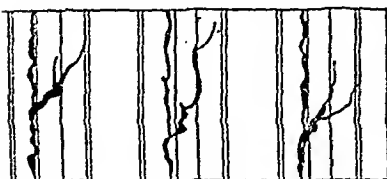


FIG. 2

There is no decided proof of the ascent or descent of gases within a spot, but Evershed has observed the former and St. John the latter. The general conclusion appears to be that S. are cyclonic disturbances with gases radiating outward at the upper end; into the region of diminished pressure the upper-level hydrogen is sucked and its temperature increased. The vortices are in opposite directions in the N. and S. hemisphere, as are those of the terrestrial atmospheres. Fig. 2 shows at three times the hydrogen line in a S. spectrum, indicating a motion of 300 m. per sec. towards the observer. The figures reproduced are by courtesy of Messrs. Ginn & Co., from Young's *General Astronomy*.

Sunstroke, Heatstroke, or Insolation, a condition of prostration or fever, brought about by excessive exposure to the sun's rays or to a high temperature. The disturbance of the normal processes by which the heat of the body is regulated produces effects upon the central nervous system which are in their turn followed

by disturbances in the respiratory and circulatory processes. The extent and form of these disturbances determine the various types of the disease. Thus, syncope may be the predominant symptom; the patient is sick and giddy, and ultimately falls into a fainting condition with a very weak pulse. He should be placed in a recumbent position, and efforts should be made to restore the circulation by stimulants, such as ammonia, ether, etc. Asphyxia may be the prevailing symptom, as in the form of S. known as *heat apoplexy*. This condition is marked by dark flushing of the face, protruding eyes, and stertorous breathing. The best treatment is the application of cold by rubbing the skin with ice. Besides these two well-defined types of S., there are numerous varieties in which different forms of respiratory or circulatory disability are manifested. The treatment should in every case be symptomatic.

Sun Worship has been common at all times and in all parts of the world, for the sun is naturally regarded as the source whence comes light, heat, life, health, and other things needed by man. The sun-god was worshipped in Persia as Mithra, in Egypt as Ra, in Greco as Apollo, and under other names in Peru, N. America, and Northern Europe.

Sun Yat-Sen (b. 1867). a mission convert's son. In 1892 he graduated with a degree in medicine at Hong Kong. An exile from China during the years 1895-1911, in consequence of the failure of a revolutionary conspiracy, he founded a political society in Japan, called the Tung Meng Hui, and was soon recognised as the leader of the Young China party. In 1912, elected by the Nanking Assembly president of the southern provinces, he resigned his office after fourteen days in favour of Yuan Shih-kai. After supporting the latter for a while Dr. S. withdrew his approval, and was implicated in the unsuccessful revolution of 1913. See CHINA.

Supererogation, Works of, a class of works which, in the Roman Catholic system, are described as not absolutely required of each individual as conditions to his eternal salvation. Roman Catholics found this definition on the distinction between what they believe to be commanded and what they hold to be only counselled, for an example of which they appeal to the words of our Lord to the young man in Matt. xix. 21, which distinguish one class of works which are necessary in order to 'enter into life,' and a further class which must only be done if we 'would be perfect.' For works of supererogation, as for all

supernaturally good works, they hold that the assistance of God's grace is indispensably necessary; and they do not ascribe to them any merit, except that which arises from God's own free and gratuitous promise. In a word, the only distinctive characteristic of a work of supererogation lies in its not being supposed to be prescribed or commanded as absolutely necessary for the salvation of the individual, but its being done for the sake of greater perfection. A further consequence of this doctrine is that God may accept the superabundant works of one in atonement for the defective service of another.

Superior: 1. The largest, most elevated, and most westerly of the five great lakes of N. America, and the largest body of fresh water on the globe. Area 31,000 to 32,000 sq. m., about one-third of which is in Ontario, Canada, and the rest in Minnesota, Wisconsin, and Michigan, U.S.A. Length 420 m., greatest width 160 m., mean depth 900 ft. It is fed by numerous streams, the chief being the St. Louis, and discharges by St. Mary's R. at the E. end into Lake Huron. There are numerous islands. The water is very pure and abounds in fish. 2. Cap. city of Douglas co., Wisconsin, U.S.A., at W. end of Lake Superior, 6 m. S. of Duluth, with a good harbour and numerous manufactures and industries. Pop. (1910) 40,384.

Superior and Superiority, in Scots law, the person who makes a grant of land or a *feu* to a grantee is called the *superior* or *feu superior*, and the grantee is or was called the *vassal*. If the grantor be himself a vassal his grantee is sub-vassal and he himself mid-superior, while the mid-superior's superior is over-superior in relation to the sub-vassal. The interest retained by the superior in the *feu* is styled *superiority* or *dominium directum*, which interest was originally the ownership of the land subject to the more or less precarious right of the vassal; the interest acquired by the vassal was the *dominium utile*, i.e. the beneficial ownership.

Superphosphate of Lime, a mixture of calcium sulphate and monocalcium phosphate, and is obtained by treating bone ash or ground mineral phosphate with dilute sulphuric acid. It is used as an artificial manure, its value depending on the available

condition in
more solid or

gaseous material than it will normally hold in solution. Consider the case of a solid which can be dissolved to a greater extent as the temperature of the solution rises. If the solution

be gradually cooled to below the point of saturation, the excess of solid is not at once deposited unless there is a nucleus present, such as another crystal. While the excess of solid is held in solution, the solution is said to be supersaturated.

Superstitious Uses, see CHARITIES.

Suppé, Franz von (1820-95), an operettist, born in Dalmatia, studied under Cigala, Ferrari, and Seyfried; settled in Vienna, where he conducted at the Leopoldstadt Theatre (1862-95), for which he wrote nearly thirty operettas. His best-known work is the *Poet and Peasant* overture.

Supple Jack, a term applied to many climbing plants which have very pliable stems. Several of these belong to the order Rhamnaceæ, e.g. *Cynophila scandens* and *Berchemia volubilis*.

Supply: 1. A grant of money provided in order to meet the expenses of government by the representatives of the people. The principle that the redress of grievances should be a return for Ss. granted by parliament

in principle fought Charles I. It was not until the 1688, when Ss. were granted annually and the necessity for annual Ss. did away with the necessity for legally enacting that Parliament should meet every year. The power of voting Ss. is invested in the Commons, but the

but not his principle, 'that is, making an ordinary measure into a financial one by tacking a financial clause to it. A money bill, or bill of S. must, however, receive the consent of Lords and King. 2. A term used to denote the system by which the army receives its Ss. of food, ammunition, and clothing. This is supplied chiefly by contract, but in some stations, e.g. Gibraltar, the bread and meat Ss. are obtained by the Army Service Corps, as they would be on active service. See LINK: OF COMMUNICATION, and ARMY—in the field.

Supply, Commissioners of, the Scotch C. of S., first appointed by the Act of Convention, 1667, were for over a century, before county councils were instituted in 1889, the leading local authority. Their special or primary function was to levy the land tax. In 1857 by the County Police Act they were given the duty of providing a county police force. The qualifying has since then been living

tax commissioners and to act with the county councils in the appointment of a standing joint committee to manage the county police force and control capital expenditure and borrowing. See *Erskine's Principles of the Law of Scotland*.

Supply and Demand, the economic commonplace that the price of a commodity depends on S. and D. means that the price of commodities must be so adjusted whether consciously or unconsciously as to equalise the demand with the supply; and that, as a general rule, the demand increases with a decrease in price, and conversely, the demand decreases with an increase in price. Where the supply is absolutely limited (e.g. rare or first editions of books) the supply is made equal to the demand by increasing the price to such a point that the demand in excess is withdrawn. Where the cost of production rises with every additional supply (e.g. coal, wheat) by reason of the greater proportional outlay of labour and capital, the supply must be increased to meet every increase in demand. Where the supply can be increased without a corresponding increase in the cost of production (e.g. manufactured goods) prices rise temporarily when the demand exceeds the supply, but fall with the stimulated increase in supply. See *Fawcett's Political Economy*; *Sidgwick's Principles of Political Economy*.

Supporters, in heraldry, the figures placed on either side of a coat-of-arms, e.g. the lion and the unicorn on the royal arms.

Suppository, a solid medicated body of a conical shape, weighing about 15 grains, designed for introduction into the rectum, vagina, or urethra. The majority of Ss. have a basis of theobroma (cocoa-butter). Gelatin is also used as a basis.

Suppuration, the process by which pus or 'matter' is formed. The usual cause of S. is the presence of pyogenic (i.e. pus-producing) micro-organisms.

Suprarenal Glands, or **Capsules**, triangular organs situated above the kidneys. Each consists of a cortical portion and a medulla. The cortex is made up of three layers of polygonal cells called respectively *zona glomerulosa*, *zona fasciculata*, and *zona reticularis*. From the cortex fibrous septa extend towards the interior of the organ and divide the cells into groups. The medulla consists of polygonal cells and nerve fibres. It is believed that the function of the suprarenal capsules is concerned with pigment production, and a conspicuous symptom of Addison's disease, which is associated with disease of the suprarenal glands, is a bronze dis-

colouration of the skin. Suprarenal extract from the glands of the sheep is used in the treatment of Addison's disease, but still more for checking hæmorrhage.

Supremacy, Royal, is a term used to designate supreme ecclesiastical authority. It is either papal or royal; but the former has for the most part, even in Roman Catholic countries, long ago been superseded by the latter. The papal supremacy was abolished by the legislatures of England, Scotland, and Ireland in the 16th century; but in order to ensure acquiescence in that abolition, particularly on the part of persons holding public offices in England and Ireland, an oath was, by an Act of 1689, required to be taken, called generally the oath of supremacy. This oath in its form, however, merely denied the papal supremacy; it contains no positive statement of the R. S. By an Act passed in 1791 it was provided that no person should be liable to be summoned to take the oath of supremacy, or prosecuted for not obeying such summons; and Roman Catholics, upon taking an oath in which the civil and temporal authority of the pope are abjured, may hold office without taking the oath of supremacy.

Supreme Court of Judicature. The Judicature Act, 1873, united the then existing Courts of Chancery, Queen's Bench, Common Pleas (q.v.) (Westminster), and Exchequer (q.v.), the High Court of Admiralty, the Probate Court (q.v.), the Court for Divorce and Matrimonial Causes, into one S. C. of J. in England. The old London Court of Bankruptcy remained a separate court until 1884, when it became consolidated with the S. C. of J. by the Bankruptcy Act, 1883. The Supreme Court consists of two permanent divisions, the Court of Appeal and the High Court of Justice. The former in two divisions of three judges, each one of which is presided over by the Master of the Rolls (see PIPE ROLLS). The Lord Chief Justice, who is the head of the King's Bench division (q.v.), the president of the Probate, Divorce, and Admiralty division, and the Lord Chancellor (q.v.), are *ex officio* judges of the Court of Appeal, but never sit there, except that the Lord Chancellor sometimes sits on the opening day of a term. When necessary a judge of the High Court (see PRISNE JUDGE) may be called in when necessary. Except on questions of costs an appeal lies to the Court of Appeal from every judgment or order of the High Court, but only by leave from an inferior court (see INFERIOR COURT). The High Court of Justice exercises an origin a

jurisdiction in all matters formerly dealt with by the old consolidated courts, and an appellate jurisdiction from the county courts and petty sessional courts. In this appellate jurisdiction the cases are heard by two judges sitting as a 'divisional court' for 'civil paper cases,' or by three judges for 'crown paper cases,' respectively. Bankruptcy and winding-up work are assigned to particular puisne judges, and the judicial functions of the Railway and Canal Commission to one judge and two commissioners. Admiralty cases are heard before a puisne judge or the president of the Probate, Divorce, and Admiralty Division, with or without the assistance of nautical assessors. The judges of the Court of Criminal Appeal are selected from the judges of the King's Bench division (*q.v.*), generally presided over by the Lord Chief Justice. The sittings of the Supreme Court are in the Strand, London (see ROYAL COURTS OF JUSTICE), but provision is made for administration of justice in the country by commissions of assize (reinforced in case of need by commissioners of assize, see ASSIZE, GAOL DELIVERY, CIRCUIT, OYER AND TERMINER); any king's counsel on the circuit or a county court judge may act in this capacity.

Surabaya, an important seaport of Java, Dutch East Indies, at the mouth of the Kali Mas R. It has artillery workshops, and is the headquarters of the military authorities for East Java. Exports include cotton, coffee, rice, and sugar. Pop. (1905) 150,000.

Suraj-ud-Dowlah, see BLACK HOLE OF CALCUTTA and CLIVE, ROBERT CLIVE, BARON.

Surakarta, a tin. of Java on the Solo. It is the centre of the Java railway system, and an important commercial emporium. It has the large palace or Kraton of the 'Susuhunan.' Pop. 120,000.

Surat, a city of Gujarat, Bombay, India, cap. of the dist. of its own name, on the Tapti, 16 m. from its mouth. Once a great emporium, its importance has declined since the rise of Bombay, and the manufacture of silk and cotton goods are now the chief industries. There is an old citadel and numerous mosques. Pop. 114,863. The district has an area of 1660 sq. m., with a pop. of 635,000. Cereals and cotton are the main products.

Surbiton, an urban dist. in the Kingston parl. div. of Surrey, England, 13 m. from London. Pop. (1911) 17,713.

Surcouf, Robert (1773-1827), a French privateer, born at St. Malo.

He was conspicuous for his attacks on English ships in the Indian seas during the war and captured the *Trilon*, 1785, and the *Kent*, 1800.

Surds, algebraical quantities the root of which cannot be exactly obtained. Thus the square root of 2, the cube root of 3, the fourth root of 4, are S. in that the quantity cannot be exactly determined. The above are written in algebraical notation as $\sqrt{2}$, $\sqrt[3]{3}$, $\sqrt[4]{4}$. S. are often called *irrational* or *incommensurable* quantities. The order of a S. is denoted by the root index, thus $\sqrt[n]{a}$ and $\sqrt[n]{a}$ are S. of the fifth, and *n*th order respectively. S. of the second order are often called *quadratic surds*. Two S. may be multiplied together, provided they are of the same order, by taking the same root of the product of the numbers under the root sign, thus $\sqrt{3} \times \sqrt{2} = \sqrt{3 \times 2} = \sqrt{6}$. The reciprocal operation also holds true $\sqrt{50} = \sqrt{25} \cdot \sqrt{2} = 5\sqrt{2}$, and in this way a S. may be reduced to one of a simpler form; when the S. does not admit of further reduction it is said to be in its *simplest form*. An expression involving two or more simple S. is called a *compound surd*; thus $3\sqrt{a} - 4\sqrt{b}$ is a compound S.

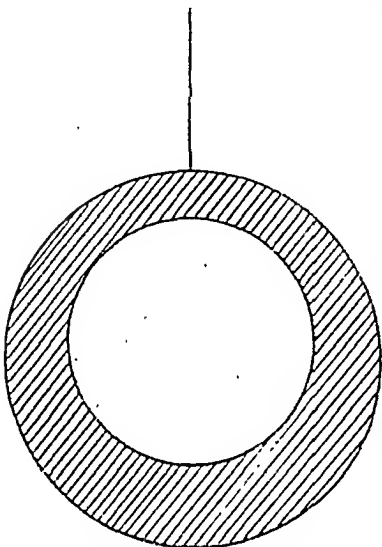
Surety, see GUARANTEE.

Surf, the foam and commotion of the sea breaking upon the shore or rocks.

Surface, in geometry. Imagine an infinite number of contiguous points in two dimensions and we have a S. That is to say, a S. may have length and breadth but no thickness. Any two contiguous regions in space must be separated by a S., and space itself must be bounded by a closed S. A S. is said to close if a point inside it cannot be joined to a point outside by any line without piercing the S. An open S. is bounded by a line. Any equation in three variables *x*, *y*, *z* represents a S. The latter is classified by the form of its equation. Thus $x^2 + y^2 + z^2 = 1$ is called a cubic S. or one of the third order. A S. of the *n*th order is cut by any right line in *n* points, real or imaginary, and a plane cuts it in a line of the *n*th order. Investigators have dealt with Ss. of orders up to the third fairly fully, but no publication has appeared on Ss. above the third order. Cones, cylinders, and other Ss. which are cut out by a right line moving in some assigned manner are called 'ruled' Ss. See SPHERE, CYLINDER, ELLIPSOID.

Surface Tension. Many phenomena show that liquids behave as if they were enclosed in a stretched membrane. Thus, if a bent wire is covered with a film of liquid and

then a closed loop of silk thread placed upon it and the film pierced inside the loop, the film outside will pull the loop of silk into a circle. Now a circle is the curve which has the largest area for a given perimeter. Thus, the liquid acts as if it possessed S. T. tending to make the surface assume as small an area as possible.



SURFACE TENSION

There is S. T. at the boundary of two liquids, whether they mix or no, and also at the boundary of a liquid and solid. It is commonly observed that a small quantity of oil on water spreads itself equally over the whole surface. This is due to the fact that the S. T. between water and air is greater than that between oil and water. Thus the greater tension on the clean surface of the water pulls the oil outwards in all directions, until the whole surface is covered with oil. For other effects of S. T. see CAPILLARITY.

Surf-bird, or *Aphriza virgata*, a species of Charadriidæ closely related to the turnstone. Its plumage is brown with white markings, and the bird occurs on the Pacific coast.

Surgeons, Royal College of. The practice of surgery was in the middle ages chiefly in the hands of barbers, and in 1460 a company was incorporated to protect the interests of London barbers who practised as surgeons. In 1511 surgery was restricted by Act of Parliament to per-

sons qualified to practise that art, and a Company of Surgeons arose who amalgamated with the Company of Barbers in 1540. In 1800 was established the R. C. of S. of London, which became reconstituted in 1843 as the R. C. of S. of England. The establishment of the General Medical Council in 1858 helped to regularise the two professions of physician and surgeon, and the work of the two colleges has from that time been co-ordinated. The college grants licentiate and fellowship diplomas and a special licentiate in dental surgery. The building in Lincoln's Inn Fields possesses an excellent museum of anatomical specimens and other material cognate to the work of surgery. The R. C. of S. of Edinburgh was incorporated in 1505 and has buildings in Nicolson Street.

Surgery, that branch of the healing art in which operative measures are relied on. Strictly speaking, the science of medicine involves only those methods of procedure consisting of the administration of substances which, by becoming incorporated into the bodily system, are expected to induce such changes as will lead to the diminution or cure of the disease. S., in contradistinction, involves actual manipulation of the part, either with the hand or with instruments. The term medicine is, however, usually held to embrace the whole science and art of healing, together with contributory sciences. As knowledge of the human frame and of the agencies which affect it for good or evil extends, so does it become more difficult to treat of S. as a separate science or a separate branch of practice. The administration of drugs as a therapeutic measure merges into inoculation with anti-toxic sera and other substances, and also into the application of such agencies as electricity, heat, cold, X-rays, etc. It is then not a long step to methods of treatment involving vibration, massage, etc., with a view to inducing changes in the chemistry of the body. Practically the only measures that are popularly regarded as surgical are those involving the removal of diseased parts and substances foreign to the normal organism. Although modern practice in medicine and S. has many inter-connecting features, the two arts have a separate history, and at some periods there has been a hostile relationship between practitioners of the kindred methods. The beginnings of S. may be studied in the practices of the savages of our own time. Wounds are dressed, foreign bodies removed by hand or by cutting, dislocations reduced, fractures set and

bound, while in desperate cases amputations are resorted to. Experience quickly shows the barbarian that a diseased part is a pain and a danger, and that the natural recuperating powers of the body are aided by the removal of a desperately diseased portion. The early civilisations of Egypt, Greece, Mesopotamia, India, and China found a place for the surgeon in their social organisation, and such operations as incisions for the removal of dropsical fluids, amputations with subsequent treatment of the stump with boiling oil or pitch, the removal of concretions from the bladder, etc., seem to have been practised at a very early period. The science of S. was transmitted to Europe by Byzantine writers, and somewhat later by practitioners who followed the Arabian tradition. The

ties. The inauguration of antiseptic methods by Lord Lister is on the whole the most important item in the events of surgical history. The mortality due to operative infection diminished enormously, and surgical methods have gained the confidence of a much wider circle. See LARYNGOSCOPE, X-RAYS, CYSTOSCOPE, etc.

Suricate, see MEERKAT.

Surinam, see DUTCH GUIANA.

Surinam Toad, see AMPHIBIA and PIPA.

Surplice (Lat. *superpellicum*, above the fur dress), a loose white linen garment with wide sleeves, worn over the cassock by clergy and certain of the laity at choir offices and at certain other times.

Surrender, see CAPITULATION.

Surrey, a S.E. co. of England, lying S. of the Thames, and bounded W. by Berks and Hants, E. by Kent, and S. by Sussex. It is about 40 m. from E. to W., and about 27 m. from N. to S., with an area of 682 sq. m. and a pop. (1911) of 919,977. Its surface is greatly undulating but hilly in parts, notably at Leith Hill (967 ft.), Box Hill, Hindhead Hill, and Richmond Hill, from which splendid views of the surrounding scenery can be obtained, the North Downs skirting its S. boundary. The soil differs considerably in its extreme parts from the centre of the county, where there are wide sandy or chalky tracts and barren heath. On the outskirts of the county the soil is rich, and is mainly under corn and grass. Market gardening is extensively carried on in the Thames valley, and medicinal

plants are cultivated, and fuller's earth is obtained in the neighbourhood of the Thames the river the Mole, Wey, and Wandle. The chief towns are Croydon, Kingston, Reigate, Guildford, Farnham, and Woking, which have various industries, but the bulk of the manufactures are carried on within the limits of Greater London. There are fine gardens at Kew, which contain an important observatory. The county is represented in the House of Commons by six members. The most important events in the history of S. are the defeat of the Danes by Ethelwulf at Ockley in 851; the crowning of seven Saxon kings at Kingston between 901 and 978; and the signing of the Magna Charta by King John in 1215. Traces of Roman occupation are to be found in various parts of the county, and the ruins of historical interest are the Maidenhead Castle, Guildford Castle, and the castle built by Wolsey on the site of the Mole at Esher, and the ruins of Waverley and Newark.

of books of a scientific character enabled the clergy to minister to the needs of the vulgar. As with medicine, however, monastic surgical science became impregnated with what would now be called superstition. The lancet was the only instrument in common use, and the practice of bleeding for any and every complaint was controlled by the observation of the changes of the moon and such phenomena. For some reason the monks were interdicted from the practice of S. in 1139 and again in 1163, but the interdict was not wholly effective. In 1540 the two callings of barbery and surgery, formerly practised by the same individuals, were separated. The same guild control throughout Tudor and Stuart times the surgeons shared the of physicians and were favoured the confidence of the higher classes. The greater power of the physicians' organisation enabled them to restrict the practice of surgeons, and it was enacted that no major operation, that is, an operation involving danger to life, should be attempted without the presence of a physician. In 1745 the surgeons seceded from the Barber-Surgeons Company and formed the Royal College of Surgeons (g.v.). With the more efficient organisation and the improved methods of surgical education the profession improved considerably in status. In the 19th century progress in anatomical knowledge led to the tendency to specialise which is still operative. The introduction of anaesthetics greatly enlarged the scope of S. Actual operations of smaller importance, a lodge resulting from methodical operations wider range of surgery

also in ruins. See J. C. Cox's
; E. Parker's
 in Surrey,
 old's Surrey
 1901.

Surrey, Henry Howard, Earl of (c. 1517-47), an English poet, the son of Lord Thomas Howard, afterwards Duke of Norfolk. He was earl marshal at Anne Boleyn's trial in 1536, and the same year accompanied his father against the Yorkshire rebels. He took part in the unsuccessful siege of Montreuil in 1544, and when commander of Boulogne from 1545-46 was defeated at St. Etienne. He was imprisoned on a charge of treasonably quartering royal arms, and executed on Tower Hill. S., with Wyatt, introduced the sonnet from Italy into England. He was also responsible for blank verse in five iambic feet, his translation of the *Aeneid* (reprinted 1814) introducing it. His *Description and Praise of his Love Geraldine*, together with forty other poems, was printed in Tottel's *Songes and Sonnettes*, 1557 (reprinted 1867 and 1870).

Surrey, Thomas Howard, Earl of (1473-1554), also held the title of Duke of Norfolk. He took part in the battle of Flodden in 1513, and as warden-general of the Marches devastated the Scottish border and forced Albany to retreat in 1523. Having already held the positions of lord-lieutenant of Ireland from 1520-21 and lord treasurer in 1522, he was made earl marshal in 1533. He was, however, ousted from favour by Hertford and condemned to death, but Henry VIII.'s death prevented his execution, and on Mary's accession he was released.

"Surrogate. An ecclesiastical judge may appoint a duly qualified deputy called a S. to act for him, but the authority of a S. cannot exceed that of his principal. According to Canon 128 a S. must be 'either a grave minister and a graduate, or a licensed public preacher, and a benefited man near the place where the courts are kept, or a bachelor of law or master of arts at least, who hath some skill in the civil and ecclesiastical law, and is a favourer of true religion, and a man of modest and honest conversation,' and any chancellor, commissary, or other ecclesiastical judge who appoints a non-qualified person as his S. is liable by the same canon to suspension and censure. See Phillimore's *Ecclesiastical Law*.

Surtees, Robert (1779 - 1834), a scholar and antiquary, author of the *History of Durham*, whose name is commemorated by an antiquarian society bearing his name. He was a

friend of Sir Walter Scott. His life has been written by George Taylor (1852).

Surtees, Robert Smith (1803-64), a novelist and creator of Jorrocks, the sporting Cockney grocer whose amusing adventures are told with racy wit in *Jorrocks' Jaunts and Jollities* and other volumes. S. was articled to a solicitor, and duly qualified, but money came to him from the death of a relative, which enabled him to give himself up to the life of a sporting gentleman with journalistic and literary tastes. He founded *The New Sporting Magazine*.

Surturbrand, a geological formation found as scattered masses among the basalts of Iceland. It consists of clay in which is embedded masses of woody material, rendering the whole suitable for a rough kind of fuel.

Survey; Courts of. These are courts created by the Merchant Shipping Act, 1876, and their primary object is to prevent unseaworthy or overloaded ships from going to sea. The Merchant Shipping Act, 1894, which replaces the above Act, provides for the constitution, powers, and procedure of C. of S. By these provisions a C. of S. for a port or district is to consist of a judge, sitting with two assessors (see remarks on expert witnesses under EVIDENCE). The judge may be a county court judge, metropolitan police magistrate, or other fit person, but where the Board of Trade appoint a wreck commissioner the latter is chosen as judge. The assessors must be persons of nautical, engineering, or other special skill and experience. Cases must be heard in open court. The functions of the court are to act as a court of appeal from the decision of the Board of Trade as to the seaworthiness of any particular ship. It will be seen on reference to the article MERCHANT SHIPPING ACT, that if the Board of Trade believe a ship to be unsafe on account of defective condition of hull, equipment, or machinery, or by reason of improper loading, it can detain the ship either on conditions or absolutely. The judge and each assessor is entitled to survey the ship and enjoy for that purpose all the powers of a Board of Trade inspector. The court also acts as a court of appeal from the refusal of a certificate for clearance of an emigrant ship and in other matters. Where the Board of Trade think that an appeal involves a question of construction or design, or of scientific difficulty or important principle, they may refer the matter to scientific referees approved by a Secretary of State.

Surveying and Levelling. Surveying has for its object the attainment of a

mathematically accurate idea of the relative positions of all points on any portion of the earth's surface in such a manner that they may be plotted on a map or plan to some scale. Levelling, a branch of surveying, ascertains the relative vertical heights of points with regard to some datum level, such as mean sea-level. The simplest form of surveying may be

party, and carefully to organise, in every detail, the routine work. In using these instruments, all measurements must be horizontal, not follow unevenness of the ground, since they are finally plotted on a plane surface. If the unevenness or slope is not great, *stepping* is the simple method adopted, the chain being stretched to the horizontal, its raised end being



FIG. 1

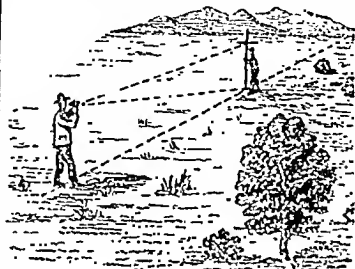


FIG. 3

called *property surveying*, which is concerned with quite small plots of land. When boundaries are rectilinear the *chain* (Fig. 1) is the chief instrument. In Britain two forms are used: Gunter's and the 100 ft. They are made of stout iron or steel wire, and contain 100 links. Gunter's chain is 66 ft. or 4 poles long, each

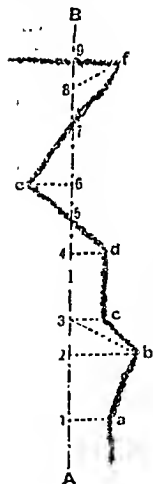


FIG. 2

link being 7.92 in., and is adopted for most work except quite small town plots. It has assumed a definite pattern and is marked at every ten links by differently shaped brass tablets; at each end is a convenient brass handle. In most other countries the decimeter chain is used. With each chain ten arrows or iron skewers are carried to place in the ground at each chain length. Where the lines to be measured are not rectilinear, the chain is used to give a line from which 'offsets' may be measured (Fig. 2) to important points by means of the *offset staff*, of ten links' length, total

6 ft. 7.20 in. To mark out lines *flagged poles*, 10 to 20 ft. long, are used; *ranging rods*, often of the same length as the offset staff, painted over each tenth with different colours, are also carried, together with bundles of laths; *whites* or thin sticks, 15 in. to 3 ft., with clefts for paper, to be used for small ranging; and a 33 ft. tape. It is usual to assign these implements to definite members of the surveying

party, and carefully to organise, in every detail, the routine work. In using these instruments, all measurements must be horizontal, not follow unevenness of the ground, since they are finally plotted on a plane surface. If the unevenness or slope is not great, *stepping* is the simple method adopted, the chain being stretched to the horizontal, its raised end being projected on to the ground by means of a plumb line: when greater, the angle is taken with an Abney level or clinometer, as shown in Fig. 3. The main lines of measurement, or base lines, should be central and intersect one another, thus giving checks; within the net thus marked subsidiary chain lines are taken, forming triangles. Where possible, as in towns, rectangles may be laid out, but in general the triangle is the figure plotted, its dimensions being easily checked by calculations from simple

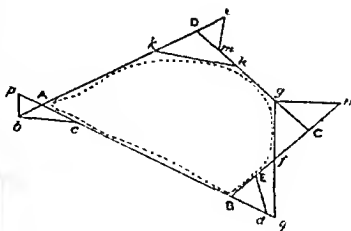


FIG. 4

It is further usual to arrange *ties* or lines across the triangles, the intersections forming useful checks to the other measurements. Fig. 4 shows a method of measuring an inaccessible interior area by surrounding chain-lines; the lines are produced forming *chain-angles*; the angles A, B, C, D

the ends of the ruler. A trough compass, *a*, to give the magnetic meridian. and spirit level are provided. From any station, a sight to a distant station can be taken and its direction ruled immediately without reading

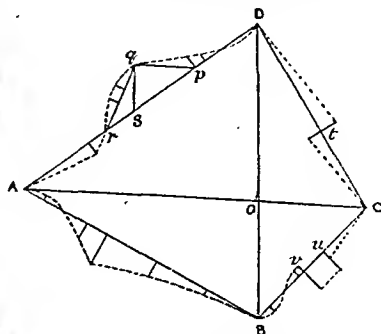


FIG. 7

off the angle. Fig. 7 illustrates the survey of an irregular area, the principal lines ABCD being the figure rectilinear approximation checked by the lines AC, BD.

Field Book.—All observations are here entered while in the field. Everything is arranged for ease of entry and computation afterwards, but particularly so that easy checks are provided as the work of observation proceeds. On the organisation of the field party and that of the observations entered in the field book depends the rapidity and accuracy of the survey, and much ingenuity is

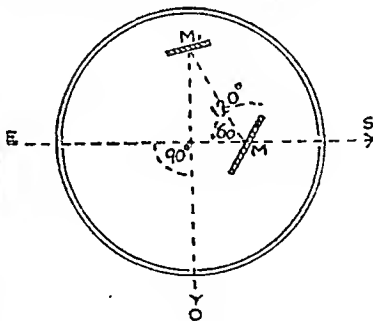


FIG. 8

shown in methods which eliminate personal error and reduce the chance of mistakes to a minimum. In large surveys the field book is despatched to headquarters, where it is used by draughtsmen in the plotting of the maps, the actual observer not being

consulted. This necessitates uniformity in the plan of field books.

The use of instruments for angular measurement, while lessening the difficulties and labour of chain survey, has its own troubles. Portability is an essential to such instruments, and great refinements are necessary in their construction if accuracy is to be secured, and a small inaccuracy in angle may mean quite a large and impermissible one in linear measurement. For this reason, the *cross-staff* with sighting slots has largely gone out of use; it is a cylindrical or octagonal box on a rod, and has slots to give sights of 90° or 45° , and sometimes has its upper part capable of rotation, a scale showing the angle.

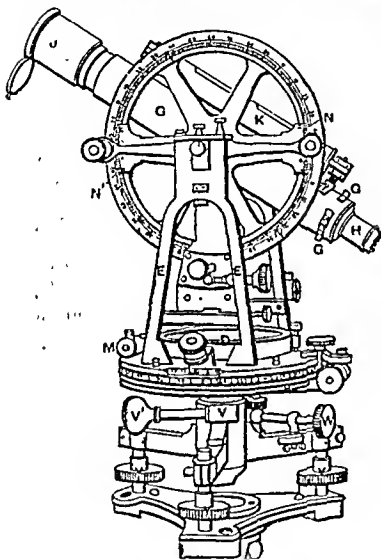


FIG. 9

arranged, as shown, in the centre piece of the Marindin telemeter (q.v.), is used; the true alignment is obtained when the images of the flags coincide. Of all instruments the *theodolite* is the most complete, its arrangement of a telescope on a vertical circle on which it rotates as a diameter, these being mounted on a horizontal circle, allows any angle from a point to be taken for all points of the compass and for a large range above or below level. Fig. 9 shows one form of the instrument resting on its levelling screws on a tripod. All movements are controlled by screws; spirit level and compass are mounted and the graduations on the two circles

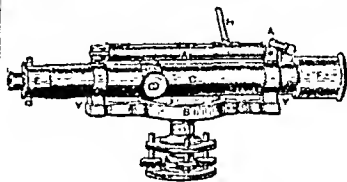


FIG. 10

read in conjunction with verniers by means of microscopes. Practically all other instruments are more handy forms, and more limited in utility. The *dumpy level* (Fig. 10) is one form of instrument used for levelling only, rotating horizontally on B. The *clinometer* is used for taking angles of elevation or depression, and is cleverly arranged for hand use. In Fig. 11, the

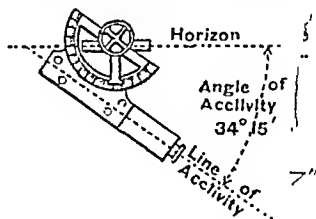


FIG. 11

The *optical square* (Fig. 8) gives a right angle, as required for offsets; a sight is taken along the chain line ES through the lower unsilvered part of M, placed at 120° across ES. The mirror M_1 is placed at 45° to E, and by walking along the chain line ES until the object O is reflected from M and M_1 , appearing exactly over the direct image of S and then to the eye, the rectangular position of O is obtained. An angle of 180° is required to determine when the observer is exactly in line between two flags; for this purpose a *line-ranger*, consisting of two prisms,

most popular form, the *Abney level* is shown in use; the telescope carries two quadrants fixed to it, a spirit level being capable of rotation round the middle of their common diameter; the level has an arm projecting into the graduations of the quadrants, and reading is carried out with the help of a vernier. The bubble of the level when central is visible through the telescope by reflection from a mirror, so that when the object and bubble are simultaneously visible, the height

above horizon is shown on the scale. Another handy instrument, the *box sextant* (Fig. 12), is very largely used for horizontal angles; for its theory

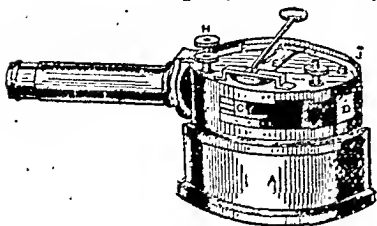


FIG. 12

see *SEXTANT*. Fig. 13 shows the *prismatic compass*; it carries a magnifying prism and sighting arrangements B and C, and silvering on the prism slope reflects to the eye the graduations

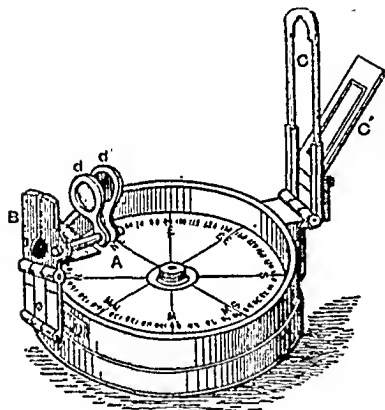


FIG. 13

tions on the compass card. For traversing the instrument is particularly handy and useful; at one reading, without adjustment, it gives the bearing of an object, i.e., its angle

patent devices for labour-saving and convenience, or for special work, such as curve-raising, are added. The immediate advantage of angular survey is in the lessening of ties and checks in the triangles, the summing of the angles to 180° giving practically all that is necessary. It is customary, therefore, to start from a very carefully measured base and rapidly to cover with . . . are compatible . . . sole area to be . . . of each triangle are then worked out by chain survey. For property surveying, steel or 'Invar,' steel with 38 per cent. metal, tapers or wires of 100 ft. or twenty-four metres are used, its co-efficient of expansion being less than one-tenth that of steel. They have the further advantage over rods in that wound on reels they can be despatched by post for testing to the National Physical Laboratory, etc. *Base-line Measurement.*—Two stations are selected, slightly elevated for convenience of sighting other points, from 4 to 12 miles apart. Terminals are sunk here, pillars erected firmly, and the ends of the base-line marked thereon. Between these firm tripods carrying small pillars are aligned, at equal distances, convenient for each tape measurement. The tape is stretched between these in turn, over frictionless pulleys, by means of weights suspended from straining trestles; an accuracy of 1 in 200,000 is obtainable, and is sufficient for all topographic work.

Levelling, in the simple form, is carried out by means of the Y or dumpy level, which is merely a telescope, with cross-wire in its focal plane, capable of movement in a horizontal plane which is determined by means of a sensitive spirit level usually mounted over the telescope. Any object seen on the cross-wires is thus at the same level with them. The *levelling staff*, a rectangular staff; is used in conjunction with the level, it is marked in feet, tenths, and hundredths from the bottom upwards.

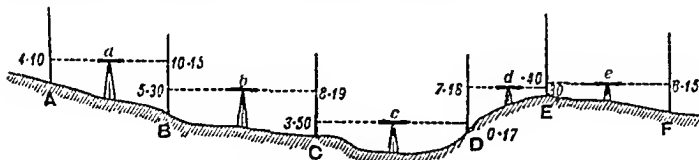


FIG. 14

with the magnetic meridian. The *telescopic form* in three sections is generally used. Simple levelling is carried out by arranging the telescope in line equally between two such staves; the *back-sight*, or reading on

the last staff passed, is taken, and then the instrument is rotated through 180° for reading the fore-sight, when the difference in reading gives the difference in level between the feet of the staves. It will be observed that this observation is independent of the height of the telescope cross-wires

above the ground. *Compound levelling* is illustrated in Fig. 14, the level occupying the successive positions *a, b, c*, etc. The following table shows a method of entering in the field book, where a datum level of 20 ft. below A is worked from; the method of checking is obvious.

Back-sight	Fore-sight	Rise	Fall	Reduced Levels	Remarks
4.10				20.00	Below at A
5.30	10.15		6.05	13.95	At B
3.50	8.19		2.89	11.06	" C
7.18	0.17	3.33		14.39	" D
0.40	0.30	6.88		21.27	" E
	6.15		5.75	15.52	" F
20.48	24.96	10.21	14.69	20.00	
	20.48		10.21	15.52	
	4.48		4.48	4.48	

Where natural objects are observed as a base from which to commence levelling, a *level mark*, of crow's foot form, is cut. Fig. 15 shows another

Contouring delineates on a plan a series of lines of equal altitude, or lines of intersection of a hill by horizontal planes. Fig. 17 shows a section which is traversed with the level, the vertical intervals being obtained by

measurement. be obtained by sections normal to the contours when plotted, or at each level on the original section the contours may be worked round by staff and level, the former being moved up and down the slope till the desired level is obtained. A peg is driven in here and the process continued. *Selling out curves* is a form of work often required. For this the theodolite is chiefly used. The radius of curvature having been determined, a point may be taken in the line from which the curve springs. Back and fore sights having been taken, the angle of the theodolite is set to give the chord, the length of which would be 1 chain. This is found by calculation or taken from tables. The series is taken as shown in Fig. 18. Two theodolites are often used, and the curve set out from opposite ends.

Heights.—Fig. 19 illustrates the method of obtaining height BC by means of a theodolite, where a base AD is awkwardly placed, the feet of the object being invisible from A. For the method of solving the triangles see TRIGONOMETRY. In this case angles CDB, CDH are observed from D, and the height of instrument DF above the peg measured. From E the angles CAD, DAH' are observed. Thus $CDH + HDA = CDA$. In the triangle ACD, $180^\circ - (A + D) = C$ and $\sin c : c :: \sin D : d$. In the right-

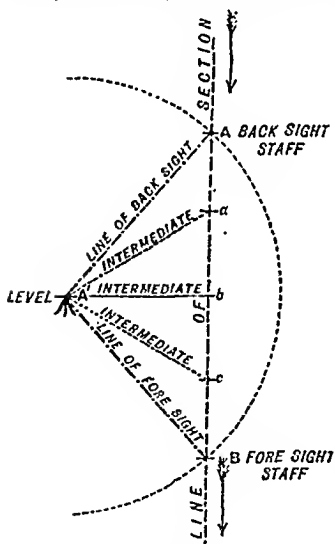


FIG. 15

method of taking levels, the instrument being placed successively on A, A' and B, etc. Fig. 16 sufficiently shows the method of angular levelling with the theodolite.

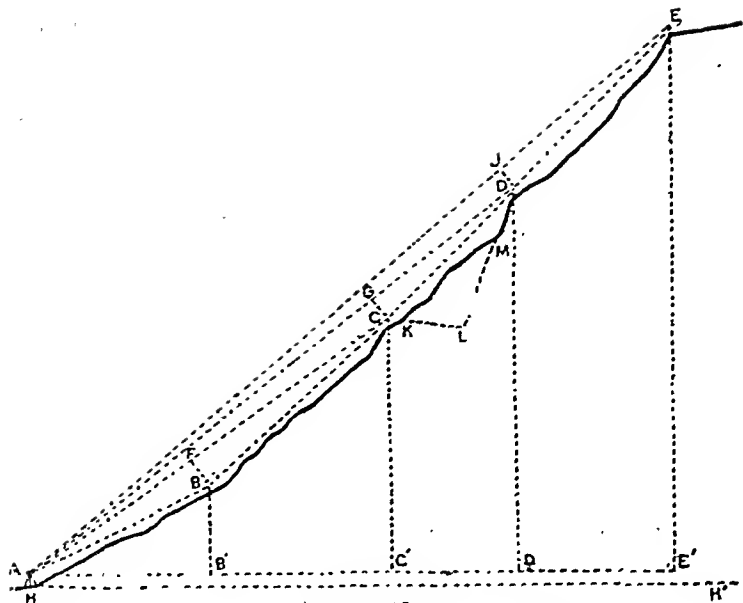


FIG. 16

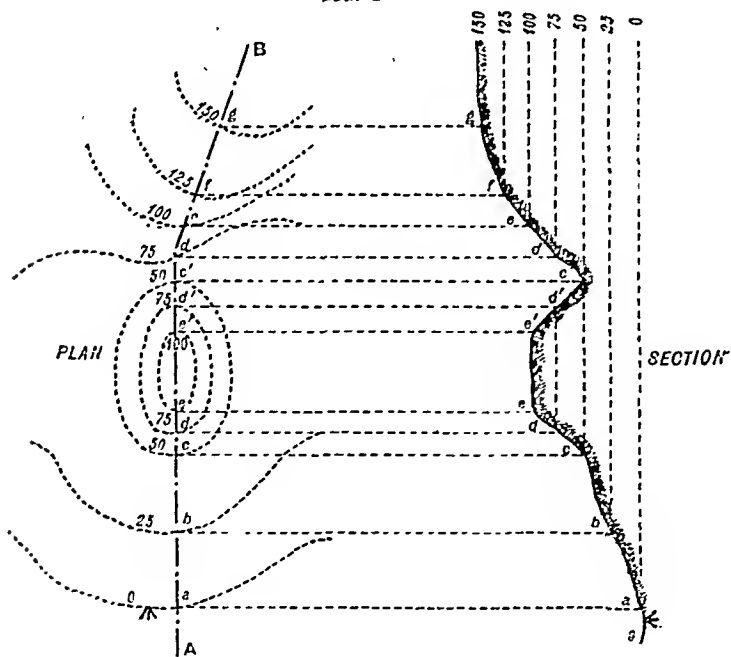


FIG. 17

the true azimuth of the station, an accuracy of two or three seconds of arc being obtainable. *Theodolite Triangulation.*—From any station a round of angles is taken between A and B, B and C, and so on to G and A, so that A is observed twice; by this means a check is placed on the angles as their sum should be 360° . As a further check the round is taken several times. If this cannot be done directly owing to weather, for instance, it is done indirectly by erecting some reference mark easily visible. The measured base is 'reduced to sea-level,' since maps are projected on to one plane, so that the remainder of the triangulation obtained by angles is automatically reduced to the same level. Modern base-measurement being a comparatively easy process, the results of theodolite triangulation are fairly often checked by chaining. In small triangles, with sides of one or two miles, the sphericity of the earth is negligible; in larger triangles this is shown on the readings, the three angles being more than 180° in sum. This *spherical excess*, depending on the area of the triangle, is easily calculated and forms another check. When subtracted from the sum, the difference between the result and 180° is known as the *triangular error*, and may be as much as two or three seconds in good topographical work. Spherical excess is given by the formula $E = ab \sin C \operatorname{cosec} 1''/2r^2$, but simplified formulæ are used for most purposes. One of the greatest difficulties is in connection with refraction; as this usually is supposed to act in a vertical plane it does not generally affect the horizontal angles, except with 'grazing rays,' which should be avoided. These are lines of sight passing close to steep slopes, where there is usually a horizontal temperature gradient. Vertical refraction in a horizontal ray is impossible to calculate; it may be avoided largely by observing in the early afternoons when it is a minimum, and by back-sighting, which eliminates it, if the conditions of the two observations are the same. Otherwise it must be corrected by calculation or reference to tables, a partial remedy only. The surveyor, when experienced, will determine it by experience, aided by a careful analysis of his readings from all other points. Over a ray of 30 m. the error may be two or three feet with back-sight; it is more when one observation only is relied on, and very uncertain indeed, in mountainous regions, or over water, sand, or snow. It may, however, be noted that a vertical angle taken from the level has only one reading error, whereas

a horizontal angle has two. A great deal may be done in checking errors by the careful selection of the second and following chained lines. In more accurate topographic survey the system of triangulation is worked up into sequences of quadrilaterals, equivalent to tying the triangles, which gives regular checks. *Geographical position* of stations may, in less extended surveys, be obtained graphically by carefully plotting the base, astronomically determined, on a *plane-table graticule*, or sheet with the latitude and longitude arcs constructed according to the methods of map projection; if the corrected angles are plotted on the graticule, the stations will fall in their true geographical positions. In more extended work this is done by calculation, the computation having been greatly simplified in the tables of the survey of India. *Levelling* with the theodolite follows the same principles as for simple survey, with the addition of the important original linking up to mean sea-level.

Ordnance Surveys.—The origin of ordnance surveys in Britain was due to the 1745 rebellion in the Highlands; the map was so useful that it was extended to the Lowlands, with the idea of finally covering the whole kingdom. In 1783 the French ambassador proposed the linking up of Greenwich and Paris by triangulation, and the scheme was put into operation. A base was measured on Hounslow Heath and the survey was taken to Dover. Connection was then made with Boulogne, Calais, and Dunkerque. This led to the principal triangulation of the United Kingdom which occupied the first half of the 19th century. The base was laid out on Salisbury Plain and measured with steel, glass, and wooden rods; triangulation was proceeded with over the whole country, not by the modern method of chains of triangles along meridians and parallels; connection was established between Wales and Ireland by the invention of the lime-light; N. of Scotland the two islands Faire and Foula made it possible to extend to the Shetlands. No base was measured in Scotland, but another was laid out by Lough Foyle, compensating bars being used. The triangles were broken up into smaller ones averaging a little over a mile a side, and these were all chained over, even the contouring being done by chain. These contours, although accurate, are too far apart. The trigonometrical survey occupied about sixty years. The datum level was mean tide level at Liverpool, but a more scientific datum is being obtained off Cornwall and in the

North Sea. A base has since been measured at Lossiemouth in Scotland, and checking from it is proceeding. Fig. 20 shows the triangulation of Norfolk and Suffolk. *India*.—The survey here has been of the highest standard, and has contributed enormously to the advance of geodesy. *Australia and Canada* are carrying out a complete geodetic survey. *S. Africa*, the geodetic survey is complete; the topographic survey of the Orange Free State has been carried out, but not that of Natal, Rhodesia, Transvaal, or the Cape, though the reconnaissance is partially done in the last named.

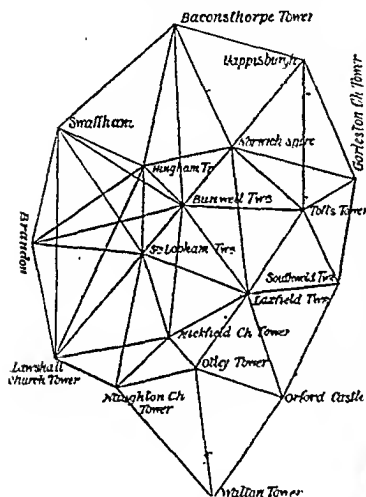


FIG. 20

Tropical Africa is further advanced under the control of the Colonial Survey Committee (1905); this body has extended its work to other colonies and dependencies. *Boundary surveys* are largely completed in Africa, 10,000 out of 17,000 mi. having been delineated chiefly during the last fifteen years. The Alaskan boundary, and that between Chili and Argentina, are instances of extremely careful work.

Route traversing has become an important branch of surveying, since it is often carried out with great labour, patience, and skill. It consists in careful observations of the route taken by an explorer, whereby his journey may be accurately laid down, and in the plotting of as much of the lateral features as he is able to observe while travelling. The work of

Dr. Sven Hedin in Tibet is a model of this type of work. In the past much error has crept into maps, notably in Africa, owing to faulty instruments and inaccurate observations of the astronomical data for selected stations en route. The improvements in instruments and the encouragement by the Royal Geographical Society have led to much more accurate work. The explorer nowadays checks his route by astronomical observations as in topographic survey, and usually carries several chronometers. Between stations he keeps a sort of dead reckoning. Distance may be measured by cyclometer or perambulator, a wheel of known circumference, often 10 ft., mounted in a fork and handles, and fitted with counting mechanism to give the number of turns; the sledge-meter used in Antarctic expeditions is a form of this. A bicycle may be so arranged. Distances measured this way have to be corrected for windings of the path and for inequalities of level up and down hill, etc. The experienced explorer usually relies on his own experience, together with the time taken to traverse the distance; he knows pretty accurately his own marching pace, the pace of his animal, of his party or baggage train. His chief difficulty lies in estimating rate up hills and down, particularly on slight almost imperceptible gradients. Windings of the path, nature of surface, weather, etc., are all sources of error. His *traverse*, or connected series of straight lines, has to be watched in its various bearings, which is usually done by means of a prismatic compass. Fixing on a distant objective he takes its bearing, and on reaching it repeats the process for another objective. This again is very difficult in hilly and forest land, particularly the latter. A portable theodolite is often carried and enables him to check his result to some extent two or three times in an extended journey. When he crosses the route of a previous explorer he may check by that, if, as is usual, he has previously obtained the records. Meanwhile he takes the bearings of distant and near landmarks from several points along his route, such cross-bearings forming another check on his traverse. He keeps a field book in which all these are entered, together with details of things he wishes to remember on either side of his track, e.g. forest, cultivation, swamp, etc. The most prominent distant features he will observe with the theodolite with greater accuracy. His astronomical bearings may be obtained within a mile by sextant, much less by theodolite, for latitude. For longitudes his

chief difficulty is Greenwich time, necessitating the carrying of several chronometers; in any case, however much care is taken, the rough journey, the joltings, and carelessness of native bearers may render them all unreliable. The errors of these may be checked, but with difficulty and laborious calculation, by observations of occultations of stars by the moon; the infrequency of these is a difficulty. With the sextant he may measure lunar distance, the distance between a star and the moon, but with less accurate results. His compass bearings are not true bearings, since the needle varies in deviation from place to place and time to time; these must be checked by observations of azimuth, the difference between which and the compass bearing gives the deviation. It necessitates a knowledge of approximate latitude, the horizontal angles of the sun and a distant object, and the altitude of the sun. The true azimuth of the sun is known from its altitude and the latitude, and by applying to this the horizontal angle of the object, its azimuth is determined. However careful and skilful the traveller may be, his route traverse is never accurate enough for correct maps. The process of levelling reduces itself to rougher methods than those of true surveying. The aneroid barometer is a usual means, but as it is affected by temperature and other weather conditions, as well as by height above sea level, only a very rough approximation can be made. If one be taken to the height required and another be kept in camp, simultaneous series of readings will give a better result. In parts of the world where variations are practically quite regular, the results of single observations may be relied on, e.g. Southern Nigeria. The hypsometer, or boiling-point thermometer, is an instrument much used, and gives somewhat less accurate results than the aneroid. The heights of mountains by these methods are given by various travellers with differences of several hundred feet.

Geodesy has for its aim the measurement of the earth considered as a nearly spherical body. Eratosthenes in the 3rd century B.C. measured the arc of a meridian in stadia, and by simultaneous observations of the sun's declination obtained the angle subtending this arc at the earth's centre, from which he calculated the earth's circumference. For a difference of n° latitude, and a distance M along the meridian between the two stations, the earth's radius = $M \csc n^\circ$. In the 17th century several attempts were made to determine this, with confusing results due to

errors in the experiments, but the determinations carried out in Peru and Lapland under the auspices of the French Academy, 1735, showed clearly the increasing lengths of degrees of latitudes the further N. they are taken. These appeared to give the shape of the earth as a spheroid of revolution, the meridians being equal ellipses. Lacaille, however, found, at the Cape, that the length of the degrees decreased: shortly after in England a similar discrepancy was noted. But it was shown that the discrepancy was due to the fact that the direction of gravity varied with the irregular distribution of mass in the earth. At a place where the vertical does not point to the centre of the earth, the horizontal which is perpendicular to the vertical is not a true tangent to the spheroid. Mountain masses deflect the vertical, but the amount can be calculated, but the allowance made does not give the result expected. At Dunneise, Isle of Wight, the vertical does not deviate towards the high down to the N., as might be expected on account of the attraction of its mass, but towards the S. The problem has been of greatest moment in the case of the Himalayas, and in 1860 Archdeacon Pratt showed that the deviation of the pendulum was not as great as the mountain masses might be expected to produce. The attraction at any point of a spheroid can be represented by formula, and the swing of a pendulum in consequence predicted. In the same way, by observing the oscillations of a pendulum in all parts of the earth, we may calculate its shape. This is, therefore, an alternative method to the triangulation of arcs of meridians. The results of the observations are peculiar: on the tops of mountains the pendulum should be subjected to a calculable lessened force of gravity, increased by the effect of the mountain mass, which can also be estimated; yet actually the latter appears to produce no effect. Again, there is a similar compensation in the case of oceanic islands according to Faye; Hiekes has confirmed this by simultaneous observations on the thermometer and barometer at many places throughout the world. Curious results were obtained in India; the pendulums swung at Kew gave a mean time of 0.5067001 sec.; swung at Dehra Dun the time was 0.5072528 sec., thus losing about 1 swing in 10,000. This gives the value of gravity at Dehra Dun as 979.063 cm. as compared with 981.2 cm. at Kew. The value corrected for height above sea level and for 'visible mass' gives 979.198. Theory (Helmert) gives

979'324 cm., so that instead of allowing for a mass 2200 ft. high, it is as if a depth of 3600 ft. existed; there is a large deficiency of gravity. S. of the foothills of the Himalayas a 'ditch of deficient density' is similarly found. Colonel Clarke calculated that the attraction of the Himalayas should be 600 ft., if it were not tested yet. Such facts show that the geodetic amplitude of an arc of meridian determined by triangulation would not accord with that obtained by the method of Eratosthenes, and this is found to be so; there are discrepancies in Britain varying from $-2''.19$ to $+1''.95$; in India from $-3''.69$ to $+3''.87$. As $1''$ lat. corresponds to about 100 ft., the two methods will give results utterly discordant. To determine a figure which would lessen the discrepancy, a calculation is made of the effect of a definite change in the assumed elliptic axis of the earth. The change for each latitude will give an equation,

and if it is a systematic discrepancy, a series of equations result, which may be solved by the method of least squares, giving the values of corrections which reduce the sum of the squares of the residual differences to a minimum; i.e. the correction is found which produces the best mean between geodesy and astronomy over the arc. The practice of geodesy, apart from the use of the pendulum, is the same as that for topographic survey, but with every possible refinement science can bring to bear on instruments and the elimination of errors. Recent work has been the remeasurement of the Peruvian arc by the French military authorities; the measurement of an arc in Spitzbergen by Russians and Swedes; an attempt is being made to link the surveys of India and Russia in Asia; Egypt is pushing its survey southwards. U.S.A. and Canada are extending their triangulations, as are Mexico and Chile in the S. The dimensions of the spheroid have been determined as follows:—

	Equatorial Semi-diameter	Flattening	Polar Semi- diameter
Bessel (1841)	6,377,397 m.	$1/299.2$	6,356,079 m.
Clarke (1866)	6,378,206	$1/295.0$	6,356,584
" (1880)	6,378,249	$1/293.5$	6,356,515
Hayford (1910)	6,378,388	$1/297.0$	6,356,909

Tacheometry.—In country difficult for ordinary traversing the tachometer may be used for the method of subtense measurement. At one end of the ray to be measured to about 50 yds. apart are placed right angles to the ray, their apart being accurately measured.

These are observed through the theodolite and the angle subtended measured; representing the angle by 2θ , the distance between the poles by $2s$, then the length of the ray $= s \tan \theta$. Another method for shorter rays is to use a theodolite with two wires at fixed distances apart on the field, and observe, along the ray, a graduated staff. The wires always give a fixed angle which will enclose more or fewer graduations on the staff, the farther or the nearer it is respectively. The stadia marks, as the wires are called, are so arranged that the graduations have only to be multiplied by a factor to give the distance of the staff from the observer. This factor varies with the distances of the wires from the optical centre of the objective of the telescope which is changed in altering the focus for

different distances. The correction for this is small and variable, but is made by adding to the computed distance, the distance from the centre

meter is an instrument which, by the introduction of a third lens in the telescope, the anallatic lens, eliminates the correction and gives the reading at once. The instrument is useful for small surveys and military work, but not for extended surveys. When used on the slope, if the graduated bar is horizontal, the computed distance must be multiplied by the cosine of the slope to give the horizontal distance; if vertical the multiplier is the square of the cosine.

Nautical surveying carried out by ships along the coast depends on the same methods of observation and triangulation. In coast-lining a shore party carries out the usual methods in conjunction with the ship. Beacons are so placed that their bearings can be taken from the ship which makes a traverse along the coast. In more

accurate coast-lining the whole of the work is done on shore, except for the determination of inshore depths, particularly the high-water line, which is often done from boats at anchor. Where stations are required in water, special methods are naturally required, and it is in these methods of carrying out the work at sea that nautical surveying differs.

Hydrographic surveying deals more particularly with the area and depths of water stretches, at sea, a lake, or river. It includes the linking up with the shore triangulation, the mapping of the margin, but particularly the sounding of depths. These are found by ordinary sounding operations carried out by a boat directed from the shore. When the water is of sufficiently small extent, a cable may be stretched across and the sounding carried on from the shore by means of a sounding line attached to the cable. The methods of determining the position of the boat from the shore are numerous, but there are different ways of selecting rays parallel and intersecting. In the case of a lake, it is merely the process of contouring by means of sounding. Such a survey often includes temperature observations, salinity, velocity, current, tides or ebbes, transparency, etc.

Mine surveying is another branch with its special methods. The linking up with surface survey is important; the first point is the fixing of the position of the upper and lower ends of a weighted wire let down the shafts, when a traverse from one to the other will give the basis for a complete survey and connect the underground with the surface. If one shaft only is available two wires may be suspended, thus giving short base lines above and below ground, the relative positions of which are known. Underground there is the necessity for special illuminations, and there is more use of magnetic bearings. Stations are usually marked in the roof, and pendulums suspended for centering, the telescope being marked on the top. When a mine is entered by tunnel or sloping shaft, the surface survey can be carried down without trouble. The mine surveyor is naturally always extending, and his observations must include all that are necessary for following the beds of coal correctly.

Photographic Surveying.—In this method, first suggested by Colonel Laussedat, a French officer, the position of several stations are fixed by trigonometrical survey, and the sights usually taken on the plane table are photographed, and plotting from these is performed in the office later. The process of plotting is very complex; the method has, however,

been extensively used in government surveys in Canada. As an alternative to plane-tableing it may be of advantage in mountainous regions, but Wilson, geographer to the U.S.A. Geological Survey, has pronounced a very unfavourable opinion of it. For most of the illustrations we are indebted to Messrs. Crosby Lockwood for kind permission to reproduce from G. W. Usill's book.

See G. W. Usill, *Practical Surveying*, 1908; J. Whitelaw, *Surveying as Practised by Civil Engineers and Surveyors*; Major-General Sir C. Warren, *Trigonometrical Surveying*; N. Kennedy, *Surveying with the Tacheometer*; J. F. Heather, *Surveying and Astronomical Instruments*; Stanley, *Surveying and Levelling Instruments*; Bourns, *Principles and Practice of Surveying*; Yolland, *Account of the Measuring of the Lough Foyle Base*; Frome, *Outline of the Methods of Conducting a Trigonometrical Survey*; E. Deville, *Photographie Surveying*, 1895; H. M. Wilson, *Topographie Surveying*, 1900; Professor J. B. Johnson, *Theory and Practice of Surveying*, 1900; Rev. O. Fisher, *Physics of the Earth's Crust*; Colonel Clarke, *Geodesy*; Survey of India, *Text-book of Tropical Surveying*; Ordnance Survey Department, *Manual of Map Reading and Field Sketching*; Close, *Text-book of Topographical Surveying*; Royal Geographical Society, *Hints to Travellers*.

Surveyors' Institution, a society incorporated by royal charter to secure the advancement and facilitate the acquisition of that knowledge which constitutes the profession of a surveyor. Its members number over 5000.

Surya, in Hindu mythology, the sun. He is represented as the son of Dyaus and the husband of Ushas the Dawn, and he moves in a car drawn by fleet ruddy horses. He is the preserver of all things stationary and moving, the source of life, and beholds the good and bad deeds of mortals.

Suryasiddhanta, a famous astronomical work in Sanskrit, said to be a direct revelation from the sun. It is sometimes identified with the Saurasiddhanta, one of the five earlier works on which the Panchasiddhantika was founded, a work by Varahamihira, who flourished about the beginning of the 6th century.

Sus: 1. A maritime tn. of Tunis, on the Gulf of Hammamet. It is the port of Kairwan, from which it is distant about 30 m. Pop. 25,000. 2. A riv. of Morocco, rising in the Atlas Mts., and flowing W.S.W. to the Atlantic. 3. A prov. of S.W. Morocco, intersected by the above river. Its port is Agadir, the scene

of European friction in 1911, owing to its being occupied by the Germans. Pop. 200,000.

Susa: 1. Or Shushan, an ancient city of Persia, on the E. bank of the Choaspes, now in ruins, believed to have been founded by Darius. It is mentioned in the O.T. (Daniel), and on its site numerous inscribed stones have been discovered. 2. A fortified tn. of Italy, in Piedmont, 30 m. W.N.W. of Turin. It has a strong citadel and a triumphal arch erected in honour of Augustus. There is also a cathedral dating from the 11th century. Pop. 5000.

Susannah, History of, known also as *Susannah and the Elders* or *The Judgment of Daniel*, a book of the Apocrypha belonging to the group of additions to the Book of Daniel. It tells how Susannah, wife of Joakim, a chaste Jewish matron, is solicited to sin by two elders, and on her refusal is wrongfully accused by them. Daniel, by his skilful questioning, proves the falsity of the accusation and Susannah is saved. Scholars are generally agreed that the work had no Hebrew original.

Susiana, see KHUZISTAN.

Suso (or Seuse), Heinrich (1300-66), a German mystic, born in Constance. He took the name of his mother (his father's name was V. Berg), and studied theology in Cologne and then lived an austere life for some forty years in the monasteries at Constance, Swabia, and Ulm (1848); at the last place he passed the remainder of his life. But S. is chiefly remembered for his books, some of which are *Büchlein der ewigen Weisheit*, *Lebensbeschreibung*; *Buch von den neuen Felsen*. See Von Görres's edition of his works (Munich), 1906.

Suspension Bridges, see BRIDGE.

Susquehanna, a riv. of Pennsylvania, U.S.A., the main branch of which rises in Otsego Lake, and has a length of 250 m. The other branch rises in the Alleghany Mts., and after a circuitous course of 200 m. joins the main or eastern branch at Northumberland. The united stream flows S. and S.E. past Harrisburg and Columbia, and enters Chesapeake Bay. It is wide and shallow, and much used for floating timber, but of little use for navigation, although canals have been constructed for this purpose.

Sussex, a maritime co. on the S. coast of England, fronting the English Channel, and bounded N. by Surrey, E. by Kent, and W. by Hants. It is 74 m. from E. to W., and about 28 m. in its broadest part. Area 1466 sq. m. Pop. (1911) 666,876. Its coast-line is unbroken by bays of any extent, but the promontory of

Beachy Head, the termination of the S. Downs (Linchball, 818 ft.), juts out into the Channel. S. is noted for the number of its fashionable watering places on its coast, the principal being Brighton, Hastings, Eastbourne, Worthing, Shoreham, Littlehampton, Bognor, Bexhill, St. Leonards, and Scaford. The middle of the county is occupied by the Weald, which was formerly a forest, now an undulating and fertile tract. On the Downs, which cross the county from W. to E., vast flocks of sheep and cattle are grazed, the Southdown breed of sheep being famous. The county is watered by the Ouse, Arun, Rother, and the Adur. Large numbers of horses are reared, and poultry farming is an important industry. The crops consist chiefly of wheat, oats, and turnips, and fruit is extensively cultivated. Fishing is engaged in all along the coast. The county returns six members to the House of Commons. The antiquities of S. are numerous and include the castles of Hastings, Arundel, Lewes, Bramber, Hurstmonceaux, Pevensey, Bodiam, etc., the abbeys of Battle, Bayham, etc.; Chichester Cathedral, which was founded in the 11th century, and several Roman encampments. The chief historical events are the landing of the S. Saxons (in 447), the battle of Hastings or Senlao (1066), the battle of Lewes (1264), while the county was also the scene of the exploits of Jack Cade in 1450. See M. A. Lower, *History of Sussex*, 1870, and A. J. Hare, *Sussex*, 1894.

Sussex, Augustus Frederick, Duke of (1773-1843), the sixth son of George III. The rather eccentric character of this prince and his marriage to Lady Augusta Murray against the wishes of the court served to estrange him from the king. His marriage was declared void in accordance with the Royal Marriage Act of 1772. In spite of the romantic nature of this marriage, the duke deserted his wife and compelled her to sue for alimony. He was made Duke of Sussex in 1801. He was president of the Royal Society for some years, and he collected a fine library at Kensington Palace.

Susten Pass, a pass in the Alps, Switzerland, which connects the Hasli Valley in the eastern part of the canton of Bern with the valley of the Reuss, canton of Uri.

Sustentation Fund, see FREE CHURCH.

Susterman, Lamprecht, see LOMBARD, LAMBERT.

Sutherland, a maritime co. of N. Scotland, bounded on the N. by the Atlantic, W. by the Minch, E. by Caithness, and S. by Ross and Cromarty. It forms a rough square

about 52 m. long by 59 m. broad, with an area of 2028 sq. m., and a pop. (1911) of 20,180. The surface is mountainous in the N. and W., the chief summits being Benmore Assynt (3274 ft.) Conivhall (3234 ft.), Bendibrick (3154 ft.), with several others approaching 3000 ft. In the E. the chief heights are the Hill of Ord (1320 ft.), and Cnoc an Eircannaich (1698 ft.). The S. and S.E. of the co. is fairly level. The coast is rocky and deeply cleft by sea lochs, with bold headlands, such as Cape Wrath and Strathly Point on the N. coast. The most important inland lochs are those of Shin and Assynt, but there are over 300 smaller ones. The interior of the co. is covered with so-called 'deer forests'; they are merely trackless wastes, destitute of trees or mountain moorland, abounding with roe deer. The most fertile, as well as the most populous district is in the valley of Dornoch Firth, where the land is highly cultivated. Dornoch is the county town. There are no manufactures, and the only industry of importance is that of fishing, salmon and herring being the chief catches. The county returns one member to the House of Commons. S. was overrun by the Scandinavians at the beginning of the 11th century, who continued their depredations in the 12th century. During 1810-20 the first Duke of S. drove the poor crofters, who occupied the interior of the county, and were eking out a precarious existence, to the coasts and valleys, causing them to endure terrible hardships on the inhospitable land. This act was called the 'S. clearances.' Dunrobin Castle, near Golspie, is the residence of the duke.

Sutlej, an important riv. of India, mainly in the Punjab, rises in W. Tibet, near Lake Manasarowa at an altitude of 15,000 ft. above sea-level. It flows through the Punjab from E. to S.W., receiving in its course the waters of the Chenab and the Bear, until it reaches the Indus near Mithankot, on the N.W. frontier of Rajputana. Length 900 m.

Sutlej, a British armoured cruiser of 12,000 tons, built at Clydebank and launched in 1899. It has a speed of about 22 knots.

Sutra, in Sanskrit a rule, or a book of rules, which form the basis of teaching, not only in religious ritual but also in philosophy and grammar.

Suttee, *see* SATI.

Sutri, a tn. in the prov. of Rome, Italy, on the Puzzola, 25 m. N.W. of Rome. It is a walled town, pierced with many gates, containing many antiquities, including a fine amphitheatre and a rock-hewn church. Pop. 2800.

Sutton, a small tn. and urban dist. of Surrey, England, 4 m. W. of Croydon. The High Street is a picturesque part of the main road to Reigate, where it ascends the downs. It is becoming a residential district. Pop. (1911) 21,275.

Sutton, Thomas (1532-1611), founder of the Charterhouse, London, a shrewd man of business, amassed a great fortune, and was supposed to be the richest man in England in his day. He spent much money on philanthropic enterprises, and is best known for having founded and endowed a school and hospital at the Charterhouse, the hospital being for gentlemen who have fallen upon evil days. The school has been removed to Godalming, but the hospital remains on the old site in the heart of the City of London.

Sutton Bridge, an urban dist. and river port of Lincolnshire, England, on the R. Nen, 7 m. N. of Wisbech. It has trade in corn, coal, and timber. Pop. (1911) 2156.

Sutton Coldfield, a market tn. and municipal bor. of Warwickshire, England, 26 m. N.W. by W. of Warwick, and practically a residential suburb of Birmingham. Farming is the chief occupation outside the town, while the manuf. of hardware constitutes the principal employment of the inhabitants. Pop. (1911) 20,132.

Sutton-in-Ashfield, an urban dist., manufacturing and market tn. of Nottinghamshire, England, 14 m. from Nottingham. It has manufactures of cotton, hosiery, and thread, and its church of St. Mary Magdalene dates from the 12th century. Pop. (1911) 21,707.

Sutton-on-Sea, a watering-place of Lincolnshire, England, 3 m. from Mablethorpe.

Suture (*sutura*, a seam), a term applied (1) to a form of articulation met with only in the skull, where union is accomplished by fibrous tissue continuous with the periosteum; (2) to a stitch or stitches closing the contiguous margins of a wound. Cranial Ss. are divided into true and false. The former, known as *sutura vera*, are those the articulating surfaces of which are connected by a series of projections and notches dovetailed together. The margins of the bones are not in direct contact, however, but are separated by a membrane which is a continuation, externally of the pericranium and internally of the dura mater. False Ss. are those formed when roughened surfaces are placed in apposition with one another. True and false Ss. are further subdivided. The true are of three kinds, namely, *sutura dentata*, *serrata*, and *limbosa*. There are two varieties of false, which

are known as *sutura squamosa* and *harmonia*. There is a great variety of Ss. which are used in hringing together the lips of a wound.

Suva, the cap. of the Fiji Is., in the island of Viti Leon. Pop. (1911) 7788.

Suvalik Hills, a range in the United Provinces, direction is parallel with Himalayas, and they stretch from Hardwar to the Beas. Many fossil remains of large animals are found here.

Suwalki, a tn. of Russian Poland, on the Hancza, 54 m. N.W. of Grodno. It is the cap. of the gov. of Suwalki, and has trade in woollen cloth, timber, and grain. Pop. 27,500.

Suwanee, a riv. of U.S.A., which rises in Georgia, flows S., and then enters the Gulf of Mexico. It is navigable as far as White Springs. It is the 'Swanee River' mentioned in the well-known song called 'Old Folks at Home.' Length 240 m.

Suwarow, or Suvórov-Rymnikski, Alexander Vassilyevich, Count, Prince Italinski (1729-1800), a Russian soldier, born in Finland. He obtained a lieutenancy in a regiment of the line, was raised to the rank of first-lieutenant three years afterwards, and in 1758, when the war with Prussia broke out, he was entrusted with the command of the garrison of Memel. In 1759 he was present at the battle of Kunnersdorf. Catherine II., in 1763, named him colonel of the Astrakhan regiment of Infantry. Five years afterwards he was commanding officer of a part of the Russian troops which were engaged in warfare with the confederation of Bary in Poland. On his return he was made major-general, and in 1773, he was sent against the Turks under Field-marshal Rumyantsov. Three victories by Suvórov over the troops of Mustapha III. prepared for the complete defeat of the Turks, and having effected a junction with the army of General Kamenskoy, a fourth victory, June 1774, put an end to the contest. In the meantime Pugacheff, a Cossack of the Don, who pretended that he was Peter III., had assembled a numerous army. A formidable insurrection threatened to overthrow the throne of Catherine; the negotiations with the Ottoman Porte had scarcely terminated when Suvórov was ordered to meet the insurgents. He settled the troubles, and soon restored perfect tranquillity to the empire. In 1783 he subjugated the Cuban Tartars and those of Budziac, and was raised to the chief command, which he held throughout the second Turkish War which broke out in 1787. In 1789 S. won the battle of Fokshany

and captured Ismail. In 1792, when peace was made between Russia and the Porte at Yassy in Moldavia the Empress Catherine appointed Suvórov governor-general of the province of Yekaterinoslaw, the Crimea, and the quired provinces round the Dniester. In 1791, when

revolted, Suvórov was sent against them. He gained several victories over the insurgents, and the storming of Pragal which was taken after a desperate fight of four hours, and which opened to him the gates of Warsaw, Nov. 9, reduced the Poles to obedience. On this occasion Catherine made him a field-marshal. In 1799, after the death of Catherine, the Emperor Paul gave him the command of the troops which fought in Italy against the French. Some reverses caused by the behaviour of the Austrian army, roused the indignation of Paul, and he recalled his forces. Suvórov learnt in Riga that he was in disgrace; nevertheless he continued his journey to St. Petersburg, and in sixteen days after his arrival Suvórov died.

Suwo-Nada, or the Inland Sea of Japan, separates the S.W. extremity of the island of Hondu from the N.E. of the island of Kiushiu.

Suydal, a tn. of Russia, in the gov. of Vladimir, 23 m. N. of Vladimír. An old town, it contains various churches and monasteries of the 13th century. The chief industries are market gardening and those connected with the manufacture of cotton. Pop. 8500.

Suzerain, a term of feudal law, now used to describe the vague relations which exist between powerful and dependent states.

Svastika, see SWASTIKA.

Sveaborg, a fortress of Finland, adjoining Helsingfors. It was constructed in 1749 and betrayed to the Russians in 1808. It suffered bombardment at the hands of the Anglo-French in 1855.

Svendborg, a thriving seaport of Denmark on the island of Funen, 23 m. S.S.E. of Odeuse. It has one of the best harbours on the island, and is an emporium for the produce of the adjacent islands. There are textile factories, breweries, distilleries, and foundries, and it exports agricultural produce. Pop. 12,667.

Sverdrup, Jakob (1845-99), a Norwegian politician, was the nephew of Johann S., over whom he exerted a great influence. He was a member of the Radical cabinet of 1884, and represented the Moderates in the Hagerup ministry, 1895. He became Bishop of Bergen in 1897.

Sverre (1151-1202), King of Norway, was a native of the Faroe Is.

He was proclaimed king in 1177, having been adopted as leader by the Birkobciner. He was a military genius, and having defeated and slain Magnus at Nordes (1184), built up a powerful monarchy with the aid of the landowners. But he had as his enemy the Church, and in 1198 the whole land was laid under an interdict. His last years were harassed by the rise of the Bagiers or 'eroziermen.'

Swabia, a name now confined to a Bavarian province, 3792 sq. m. in area, with its capital at Augsburg. Pop. (1910) 789,853. It was originally used to denote a province of Germany which existed in the middle ages.

Swadlineote, a tn. of Derbyshire, England, 15 m. from Derby. It has manufactures of earthenware and freelay goods. Pop. (1911) 18,676.

Swaffham, a market tn. of Norfolk, England, 15 m. from King's Lynn. It has a fine church with a carved roof of wood and possesses iron foundries, besides a considerable agricultural trade. It is also noted for its cattle and sheep fairs. Pop. (1911) 3234.

Swaheli, or Suahili, a people inhabiting the coastal region of E. Central Africa, German E. Africa, and British E. Africa, between Mombasa and Zanzibar. They are of Bantu origin, but have mingled freely with the Arabs, who have greatly influenced their customs, language, and religion. All profess Mohammedanism.

Swahili is used for the various whom the S. are constantly in touch, either as caravan leaders, traders, or expeditionary guides and porters. See Krapf's *Dictionary of the Suahili Language*, 1882; Steere's *Handbook of the Swaheli Language*, and his collection of *Folk-Tales*, 1869; and Madan's *English-Swahili Dictionary*, 1894.

Swale, a riv. of Yorkshire, England, which rises in the mountains on the border of Westmorland, and flows E. and S.E. to the Ure, which it joins to form the Ouse. It has a length of 60 m.

Swallow (*Hirundo rustica*), the well-known passerine bird, which is widely distributed throughout Europe during the summer, but winters in Africa and tropical Asia. It begins to arrive from the end of March, but in the course of its migration it is ruthlessly destroyed in Southern Europe for its plumage, and its numbers appear to be gradually diminishing. Its back and wings are blue-black; the throat and forehead, chestnut; and the breast, pale buff or pinkish. Its two outside tail feathers are elongated into a graceful fork, which is more pronounced in the male. Its

nest, somewhat like a flattened cup, is made of mud, straw, hair, and feathers, and is usually built attached to the rafters of barns. Ss. feed entirely on winged insects, capturing them in the open month, which is lined with bristles made viscid by a salivary secretion. It is, therefore, of great economic value, and the increasing prevalence of gnats and other insects may often be traced to the disappearance of this bird. Other species include the red-rumped S. (*H. rustica*) of the eastern Mediterranean.

Swallowing, or Deglutition, the act by which food leaves the mouth cavity for the gullet. The contraction of the tongue muscles pushes the food from the top of the tongue backwards to the fauces. The soft palate is then raised by reflex action to prevent the food proceeding to the nasal cavity, and the glottis closes to prevent it entering the larynx. The constrictor muscles of the pharynx then urge the food into the gullet, where it is impelled towards the stomach by peristaltic action.

Swallow-wort, a name applied to many species of *Asclepias* (q.v.), with reference to the resemblance of the seeds to a swallow in flight.

Swammerdam, John (1637-80), a celebrated natural philosopher. He went to the University of Leyden in 1651, and in 1653 was admitted a candidate of physic in that university. In 1663 he published a *General History of Insects*, and in 1675 his *History of the Ephemeras*. His works were translated by Gaubius from the original Dutch into Latin, from which they were translated into English and published in 1758.

Swampscott, a tn. of Essex co., Massachusetts, U.S.A., noted as a fashionable watering-place. Pop. (1910) 6204.

Swan (*Cygnus*), a genus of birds with elongated body and neck and short feet. The base of the bill is fleshy and naked, and the soxes are similar in plumage. About eight species are known, of which four have been known to visit Britain in the wild state. The mute S. (*C. olor*) is the semi-domesticated bird of rivers and ornamental waters. It has the front part of the bill orange. Its young are greyish-brown, while those of the smaller Polish S., a sub-species, are white. The whooper or whistling S. (*C. musicus*) has no knob at the base of the bill, the tip of which is black; it differs also in the carriage of its head and neck. The plumage is pure white with dull black legs and feet. Bewick's S. (*C. bewicki*) is the smallest British S., and frequently visits Britain in the winter. The bill is black and the deep yellow of the

basal portion does not extend below the nostrils. The trumpeter S. (*C. bucci notora*) is a N. American bird of great size. The bill and feet are entirely black. Another N. American species is the common American S. (*C. columbianus*), which usually has a yellow patch in front of the eye; it is slightly smaller than the trumpeter. Other species are the black-necked S. (*C. nigricollis*) of S. America and the black S. (*C. atralus*) of Australia.

Swan, Annie S. (Mrs. Burnett Smith) (b. 1860), a novelist, born at Gorebridge, near Edinburgh. She began her literary career by writing for the local papers, but afterwards wrote books for children, and finally took up novel writing, publishing her first, *Aldersyde*, in 1883. Other novels are: *Gates of Eden*, *A Lost Ideal*, *A Victory Won*, *Who Shall Serve*, *A Divided House*, *The Curse of Cowden*, *Mrs. Keith Hamilton, M.B.*, *The Ne'er-do-Well*, *Not Yet*, *Burden Bearers*, and *An Only Son*. She is also interested in the *Woman at Home*, and has contributed largely to it.

Swan, John Macallan (1847-1910), a painter and sculptor, born at Old Brentford. He studied at the Royal Academy as well as in Paris, and began to exhibit in 1878, devoting himself at first to painting, but afterwards taking up sculpture as well. Among his pictures are 'The Prodigal Son,' 'Maternity' (a lioness suckling her cubs), and 'Leopards'; and among his works in sculpture are: 'The Walking Leopard,' 'Orpheus,' 'Indian Leopard and Tortoise,' and the eight colossal lions for Rhodes's monument at Groote Schuur, Capetown. He was elected a member of the Royal Academy in 1905. He wrote a *Treatise on Metal Work*.

Swan, Joseph (1791-1874), an English anatomist, was surgeon to the Lincoln County Hospital, 1814-27. He did much for the science of anatomy, excelling especially as a dissectionist. He became F.R.C.S. in 1843. His chief work was *A Demonstration of the Nerves of the Human Body*, 1830.

Swan, Sir Joseph Wilson (b. 1828), an inventor, knighted in 1904. Sir Joseph was born at Sunderland and educated locally. He made his name by his inventions, many of which are in constant use as familiar processes of modern life. The carbon process of printing in photography is due to him, the development of the 'rapid' plate in the same science, and many improvements in the processes of electro reproduction. He is best known, however, for the incandescent filament electric lamp, which was the first successful lamp of its kind. A miner's electric safety lamp is

another of his better-known inventions.

Swanage, a market tn. and watering-place on the Isle of Purbeck, Dorsetshire, England. There are stone quarries and the manufacture of straw hats. Pop. (1911) 4680.

Swanee River, see *SUWANEE*.

Swanevelt, Hermann (c. 1620-90), a Dutch landscape painter and engraver, born at Woerden. He travelled in Italy, studying the scenery, etc., but ultimately met Claudio Lorraine, with whose help he became one of the leading landscape painters of his day. He also executed a number of etchings, said by some to have been better than his pictures.

Swan River, a riv. of Western Australia, which rises under the name of the Ayon, and after flowing N. and W. enters the Indian Ocean. Perth, the cap. of W. Australia, stands on its banks.

Swansea, a market tn., seaport, and parl. co., and municipal bor. of Glamorganshire, S. Wales, at the mouth of the R. Tawo. It is the chief seat of the copper trade, although copper smelting, which during most of the 19th century was the chief industry, has not maintained its relative importance, and produces three-quarters of the tinplates and ninety-twentyfifths of the spelter or zinc manufactured in the kingdom. Besides this, it has the largest tube works in England, and manufactures gold, silver, steel, iron, nickel, cobalt, yellow metal, sulphuric and hydrochloric acids, creosote, alkali, patent fuel, bricks, and flour. The harbour and docks are extensive, and there is an active trade in coal and patent fuel with the chief British ports and those of the continent, although this was much hindered in 1911 by the strikes. The castle, whose tower is a picturesque feature of S., is said to have been originally built about 1120, but was rebuilt about 1330. The Royal Institution of S. Wales, founded in 1835, has a handsome building in the Ionic style, and contains a museum, a library with the original contract of alliance between Edward II. and Isabella, and an art gallery. The grammar school was founded in 1682 by Hugh Gore. S. was chartered by John and incorporated by Henry III. Pop. (1911) 114,673.

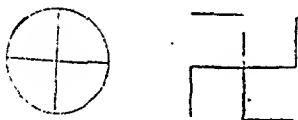
Swansea Bay, a bay in Glamorganshire, Wales, which enters from the Bristol Channel.

Swanwick, Anna (1813-99), an educationist, and a pioneer of the modern feminist movement. By her work in connection with the women's colleges, such as Bedford College and Girton, she did much to further the

cause of the higher education of women. She was one of the first presidents of Bedford College. In addition to her philanthropic and scholastic work she published several books, making translations from the Greek and the German.

Swartz, Professor Olaf (1760-1188), a Swedish botanist, remembered chiefly for his *Flora Indica Occidentalis*. After him was named the leguminous genus *Swartzia*, which includes a number of tropical American shrubs and timber trees.

Swastika, also called Fylfot, a curious religious symbol or talisman, believed to have originated in India or China and introduced into Europe in the 6th century. In form the S. is a Greek cross, the arms of which are like elbow-joints, all bent at right angles. Sometimes the figure is comprised in a circle, the circumference of which is described through the extremities of the arms. In the East



SWASTIKA

the S. was used as a mystic symbol by the Buddhists, and apparently it is still so used at the present day by the Buddhists and Jains of India and in China, Japan, and among the Indian tribes of America. In Europe in the middle ages the S. often figures in decoration and embroidery. Instances are to be seen in the embroidery on the mitre of Thomas à Becket, and again on the brass in Lewknor Church, Oxon.

Swatow, a treaty port of China in the prov. of Kwangtung, on the E. coast at the mouth of the R. Han. The manufacture of sugar is the chief industry, the surrounding country being a great sugar-cane district, and next in importance is the manufacture of bean-cake. It has a considerable foreign trade (opened in 1869) chiefly with Great Britain, and exports tea, grass-cloth, pine-apple cloth, oranges, fans, pewter, and iron and tin wares. A railway 200 m. in length is under construction to connect S. with Canton. Pop. (1910) 96,000.

Swaziland, a native state of S. Africa, lying in the S.E. corner of the Transvaal, administered by the High Commissioner for S. Africa. It has an area of 6536 sq. m. and a pop. of 99,959, of whom 98,733 are natives of Zulu type, the remainder being Euro-

peans. The country has fine grazing land, and stock-raising is the chief occupation of the inhabitants. The agricultural products consist of maize, tobacco, beans, sweet potatoes, pumpkins, and ground nuts. Its mineral resources are as yet undeveloped, but gold and tin are mined to a small extent. Cotton plantations are being established. A police force was created in 1907, composed of about 200 men. There are four government schools for Europeans, and one native school at Zombodé. In 1910-11 the revenue amounted to £58,723 and the expenditure to £62,258.

Swearing, in its various forms, cursing, blasphemy, profane and obscene language, is an offence which is either dealt with summarily under Acts mentioned below, or, in the case of blasphemy, by indictment. S. was for long a matter for the ecclesiastical courts administering the canon law, and remained outside the province of the common law altogether. By an Act of 1624, 'profane cursing and swearing' were visited with the stocks or a fine of 1s. Later, by the Profane Oaths Act, 1745, S. having apparently become extraordinarily general, a scale of charges varying with the social status of the offender was imposed; the curse or oath of a labourer, common soldier, or seaman cost him 1s.; of any other person under the degree of a gentleman, 2s.; of any person of or above the degree of a gentleman, 5s. A string of oaths would, however, be regarded as a single complete offence. It seems that the Act does not apply to women (*Stone's Justice of the Peace*), though no doubt a conviction for disorderly conduct would follow. The penalty is recovered by information on oath of any person, and the charge must be proved within eight days next after the offence. Default in payment is followed by imprisonment with hard labour, as regulated by the scale of punishments in the Summary Jurisdiction Act, 1879, but the term must not exceed ten days. The penalties are applied to the relief of the poor of the parish. The Act is still in force, but is not often made use of, because convictions can be obtained against most local offenders under either: (1) The Town Police Clauses Act, 1847, which punishes profane or obscene language in the streets if uttered to the annoyance of residents or passengers with a fine not exceeding 40s., or imprisonment with hard labour; or (2) the Metropolitan Police Courts Acts for S. in metropolitan districts; or (3) by-laws made under the Local Government Act, 1888, and the Municipal

Corporations Act, 1882, framed for the punishment of S. in the districts of municipal corporations. As to blasphemy see under that title.

Sweating Sickness, or English Sweat, an epidemic sickness, which suddenly appeared in England in 1485, a few weeks after Henry VII. ascended the throne. The disease attacked persons of high social position even more numerous than the poorer classes. It commenced with a chill and giddiness, followed by febrile symptoms, and pains in the neck and limbs. The patient was tormented with thirst and drenched with an inexhaustible sweat. He either recovered or died within twenty-four hours. The disease disappeared again in a few weeks, reappeared in 1508, 1517, 1528, and 1551, since when no epidemic exactly answering the description has been recorded.

Sweden: The country is on the whole agricultural, and live stock are reared in many parts. This is an industry for which much of the country is very suitably adapted. The provinces which yield the greatest increase are Scania and Halland, and here much progress has been made during recent years. The wealth of forest lands and the excellence of the timber grown has done much to promote an industry which is increasing rapidly every year, and which has a great export trade with Great Britain. The export of timber is the greatest industry, as far as trade returns are concerned, which the country at present has. On the whole the general observation may be made that within recent years the Swedes have made great progress. The excellence of their trade and technical schools has helped much in this matter, whilst they have also used to a great extent the water power of the large number of rivers. The mineral wealth of the country is enormous, the iron mining industry being the greatest and most important. Huge deposits of iron are to be found in Lappland, zinc is found at Ammeberg, copper is mined at Falun, and silver at Sala. Coal is found in scarcely noticeable quantities, and what little there is is found principally in Scania. The iron of the country, however, is famous for its purity as well as for the quantities in which it is found. The trade and commerce of the country is helped much by the excellence of the means of communication. The roads are good and are to be found in all parts of the country. The efficacy of the natural waterways is much improved by the canals which have been built to complement them, and in this way communication is kept up during

the whole of the open season. The railway system has recently been greatly improved, and S. can now boast a greater mileage of railways per head of population than any other country in Europe. Naturally in the lowlands of the south, communication, especially railway communication, are better than in the N., but even there the railway communication can be described as efficient. The telegraphic and telephonic systems have received much attention and are in a very highly developed state. Speaking generally, as regards education, we may say that the Swede is very well educated. Attendance at school is compulsory, and almost all the inhabitants can read and write. The educational system has within recent years received much attention and is at present highly developed. The army is good and well trained, and the navy has been but recently improved and increased. On the whole we may say that S. has shown remarkable progress during recent years. The average population of S. per square mile is about 31·8 persons. Area 172,876 sq. m. Pop. 5,521,943.

DIVISIONS AND TOWNS.—The three chief divisions of S. are Svealand, Götaland, and Norrland. The two former represent an old historical division which, in turn, represents a difference of race and tradition, and which was divided by the great forest lands of S.

Svealand may be regarded as the essential part of S., the mother province. Here at the outlet of the Mälär Lake is to be found the capital, Stockholm, one of the finest cities of Europe. The modern town far exceeds the limits of the ancient one, but here are to be found at the present time the old palaces and the old burying places of the royal house, fine schools and colleges, and many magnificent buildings. The town itself is the centre of the chief industries of S. and has a huge import trade, though its export trade is exceeded by the towns of Göteborg and Malmö. The town is well defended and well fortified. In the immediate neighbourhood is found the town of Upsala, which contains an historic cathedral and the oldest of all the Swedish universities, founded in 1477. The town of Falun, also in this district, is notable for its copper mines.

Norrland has numerous towns, most of which are at the present time increasing in value and prosperity. They are found chiefly on the coast, and amongst them may be mentioned Gefle and Sundswall. The interior has not many towns and certainly none of note. A railway connects up the

mines of the Gellivara district with the town of Luica.

*Göta*land contains the most fertile districts and includes Scania. The greatest of all its towns is Gothenburg or Göteborg, which has the largest export trade of all the towns of S. In appearance and picturesqueness it is, however, inferior to Stockholm. Other towns of importance are Helsingfors and Malinö. The town of Lund, which stands inland, is of interest since it contains S.'s second university, founded in the year 1668. This district also contains the town of Norrköping, which may be regarded as the greatest industrial centre of S. Standing on the island of Gothland is the old town of Visby, which during the days of the old Hanseatic League was of vast importance, but now owes its chief interest to the fact that the ruins of its old church and its walls prove a great attraction to the visitor. On the whole, practically one-fifth of the entire population of S. live in the towns. The remainder live on farms principally, but in the south many villages are to be found.

HISTORY.—The early history of S. is, of course, closely wrapped up in legend and saga. The country appears to have been inhabited by two separate races which were, however, very closely related, the Sver and the Goter, names which can, of course, be traced in many place-names at the present time. The old mythology of the North, or worse, remained the religion of the people until well into the 12th century, although Christianity was introduced at a very much earlier period. It failed, however, to assimilate the whole of the country until very much later. During the 14th century Finland was added to the territories of S., but the ruling dynasty of S. was so weak that the nobility and clergy were able to extort privilege after privilege, which left the monarchy in an exceedingly weakened state. Finally, in 1397, they united themselves with Norway and Denmark by imploring the aid of Margaret of Denmark, who by the union of Kalmar united the three kingdoms. But the union was far from being successful. It certainly succeeded in its immediate aim, but later monarchs became irksome to the Swedes. They had no sympathy with a monarch, German in race and ideas, who would do little for their national aspirations. They formed national parties, they conspired, they rebelled, but it was not until the beginning of the 16th century that the real revolt came. Christian II. of Denmark aimed at the extirpation of the Swedish nobility; S. rebelled under

a scion of the Vasa family, who, in 1523, after a two years' rebellion, was acclaimed and elected by the Riksdag Gustavus I. of S. But S. did not regain her freedom right away. Denmark still held possessions in the southern mainland and the island of Gothland. Gustavus I.'s reign was the scene of the struggle between the old faith and Protestantism. By 1529 Protestantism had been adopted as the state faith, but merely, or rather, to a great extent from a political as much as from a religious point of view. But the faith was even yet by no means definitely established. By the end of his reign Gustavus had been instrumental in establishing some stability and some financial soundness in the country, but his work was hardly continued by his sons, Eric XIV. (1560-68) and John III. (1568-92), both of whom rather inclined towards Roman Catholicism and did little by their foreign wars, chiefly with Denmark and Russia, to strengthen their country. Sigismund, elected King of Poland, 1587, was a pronounced Roman Catholic, and was in 1599 forced to leave the country by his uncle, Charles IX., who succeeded him. He was a staunch Protestant, and by the Synod of Upsala strengthened the hands of the Reformation very considerably in S. He aimed at a great Protestant league, of which he should be the leader, but he died before he had accomplished this, leaving the throne to Gustavus Adolphus, the Protestant champion of Europe, during the middle stages of the Thirty Years' War (*q.v.*). S. made great strides under Gustavus Adolphus. A war with Denmark was the least successful of her affairs, but was brought to a close by Gustavus Adolphus. War with Russia gave S. control of what is now the Baltic coast of Russia, whilst war with Poland ended in a truce which gave S. a grip on the mainland of Germany. He next turned his attention to the Thirty Years' War and appeared as the Protestant champion of Europe. Between 1629-31, he carried all before him; the Catholic League was defeated, the Catholic general, Tilly, outmanoeuvred and finally killed, and Gustavus Adolphus was able to penetrate to the south. He was recalled by the attacks of Wallenstein in Saxony, and fell at the victory of Lutzen in 1632. He was the real founder of the greatness of S. He made her a strong power by his internal and financial reforms, and he won for her a great place in the councils of Europe. The government was centralised and strong; the army was reformed, and S. for the next

century can be really regarded as one of the great powers of Europe. Gustavus Adolphus was succeeded by his daughter Christina, whose minority was made famous by the statecraft of the chancellor, Axel Oxenstjerna, a true political successor of Gustavus Adolphus. The success of S. was seen at the Treaty of Westphalia. She became the controlling power of Germany, the Protestant champion of Europe, and the greatest power of the N. Denmark, gratuitously seeking trouble in 1644, was by the treaty which followed in the next year stripped of much that she had previously possessed. In 1654 the crown was handed over by Christina to her cousin, Charles X. He continued the work of Gustavus Adolphus. His great ambition was to make the Baltic a Swedish lake. He attacked Denmark and gained some territory, and in 1660, the year of his death, by a treaty with Poland he added still more to the German territories of S. Charles XI., who succeeded, was only four years of age, and his long minority saw the wasting of the resources of S. by an effete nobility. A useless war was fought against Denmark and Brandenburg, and dragged on until Charles himself was able to take part in it. By his exertions he was able to preserve intact the territories of S., and then turned his attention to internal reform. He crushed the nobility judiciously but on occasion cruelly. He instituted many reforms; he gained on the whole the support of his people, and left S. reformed and restored at his death in 1697. Charles XII., the wonder of Europe, succeeded. He spent the twenty years of his reign in almost constant warfare, but a warfare forced on him by the combination of his enemies. Charles did his best, astonished Europe by his enterprise and dash, but was really badly beaten, and his death probably alone saved S. from utter disaster. During the next fifty years, under the rule of Ulrica Leonora (d. 1720) and Frederick (d. 1751), much of her territories were ceded to Hanover, Prussia, and Russia. She had now fallen from her high estate and can no longer be regarded as a first-class power. The 18th century witnessed in S. a great struggle between rival factions for constitutional monarchy. Hitherto, S. may be said to have been ruled by a despotism, sometimes benevolent, sometimes not. Now she claims a constitutional monarchy, in which the chief power was to be vested in the Riksdag or Parliament. But even this reform was carried to extremes; party quarrels were frequent and

bitter, the state of the country quickly became practically anarchic, and S. appeared to be on the verge of utter dissolution. But by the coup d'état of Gustavus III. she was again saved. The constitution again became monarchical but of the type of a limited monarchy. The power of the purse was expressly reserved to the Riksdag, but otherwise Gustavus ruled as a benevolent despot. Finance and commerce were reformed, and S. seemed again to be about to become a power to be reckoned with. Gustavus also raised the prestige of the nation by his successful wars with Russia and Denmark. He was assassinated in 1792. During the reign of his son, Gustavus IV., practically all the foreign possessions of the country were lost to Russia and Prussia. In 1809 Gustavus IV. died and was succeeded by his uncle, Charles XIII., who adopted as his heir Charles John (formerly Marshal Bernadotte), who was also elected heir by the Riksdag (1810). In 1815 S. and Norway were united and remained so until the bloodless dissolution in 1905. The crown passed to the family of Bernadotte, in which family it still remains. During the 19th century S. has played but a little part in the politics of Europe. The constitution has been revised and, as has been pointed out, Norway has seceded.

LANGUAGE AND LITERATURE.—The literature of S. is almost entirely modern. The runes which have been preserved since very early days have a great historic and archeological interest, but hardly have any influence on literature. The real beginnings of Swedish literature approximate to that period when S. was beginning to take a really active and prominent part in the councils of Europe. Educationally, S. had fallen away from her earlier traditions by the time of the Reformation; and inhabitants were perforce compelled to seek for education in the universities of Germany. As, however, in other cases the translation of the Scriptures into the vernacular which accompanied the Reformation definitely fixed the language of S. The beginning of the

melse. He was followed by Stephen Columbus (d. 1679) and Peter Lagerlof (d. 1699), a poet whose religion is personified in his poetry. The next influence felt in S. was that of the German schools, and for a time the outburst of the 17th century died away. Towards the close of the 17th century a revival, caused very

largely by English influences, sprang up. The influence of the Restoration poets, and later and more especially the influence of Swift and Addison, was very largely felt, and in this period we have the production of many dramas and much really fine work. The great names of this period are Samuel von Triewald, Carl Gyllenborg, and Modée, together with, perhaps, the greatest of all names, Dalin. Amongst the latter's works may be mentioned: *Svenska Argus*, where Addison's influence is very largely seen, *Aprilverk*, and *Saga om Hasten*. He also was the first historian of any critical value, as can be seen from his book *Svea Rikes Historia*. The 18th century witnessed a beginning of the French influence and the vogue of pastoral poetry, which finds such ample expression in Creutz (d. 1785). Gustavus III., himself a playwright of no mean merit, as witness *Siri Brahe* (1788), not unnaturally gave great impulse to literary movements, and his reign may be regarded as the golden age of Swedish literature. Amongst the writers of that period who may be mentioned are: Oxenstierna (d. 1818), author of *Skordarne* and *Disa*; Kellgren (d. 1795), influenced largely by Voltaire, editor of the *Stockholm Post*, and dictator of literary circles during the later part of the 18th century; Leopold, critic and satirist. All of these writers wrote largely under French influence and looked to France as their model. National literature with national ideals and ideas, however, was exemplified in the writing of Bellman, Lidner, Hallman, and Kexel. Thorild (d. 1808) was separated from both these schools, in fact he formed a school of his own, and was certainly little appreciated and probably still less understood. He flourished as a poet during the latter part of the 18th century, and separated itself from the earlier formal literature of that country. Of the Romantic school may be mentioned Askelof and Atterbom, who exemplify this school best. Under the title of the Gothic Union we find banded together a body of writers, whose object is to extol the greatness of S. and to extol everything that is Swedish; to this union belonged Esaias Tezner, the author of the famous *Frithjofs Saga*. The mystic Stagnelius stands apart from all these. Of the 19th century Runeberg is one of the finest poets, and romance is to an extent typified by Frederika Bremer and Emilie Flygare-Carlén, both of whom wrote excellent romances, whilst almost at the same time we find the beginning of the historical romance. *Fallskarene*

Berättelser is the greatest of these historical novels. Neo-Romanticism had as its leaders Nyblom and Snoilsky, leaders of a body of men who were critics and poets. Snoilsky's *Svenska Bilder* is one of the greatest of Swedish poems. The modern realistic school has for its leader Georg Brandt, who has perhaps been responsible for the broadness of thought and realism of description of the writers of that school.

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Swedenborg, Emauel (1688-1772), the eldest son of Jesper Swedberg, bishop of Skara, in Sweden, born at Stockholm. He was educated at the University of Upsala, and studied the learned languages, mathematics, and natural philosophy. At the age of twenty-two he took his degree of doctor of philosophy, and published the academical dissertation which he had written for the degree on the Mimi of Seneca and P. Syrus, and others. In 1710 Swedberg came to England, and spent some time at Oxford. He lived afterwards for three years chiefly in Utrecht, Paris, and Greifswalde, returning to Sweden in 1714, through Stralsund, just as Charles XII. was commencing the siege of that city. His next productions were a small volume of fables and allegories in Latin prose, and a collection of Latin poems. In 1716 Swedberg commenced his *Dædalus Hyperboreus*, a periodical record of inventions and experiments by Polhem, the great Swedish engineer, and others, and of mathematical and physical discoveries of his own. In 1716 Swedberg was invited by Polhem to repair with him to Lund to meet Charles XII., on which occasion he was admitted to much intercourse with the king, who appointed him assessor in the Royal Metallie College of Sweden, and directed that he should accompany and assist Polhem in constructing his mechanical works, among which were the locks between Wener Lake and Göteborg. The *Dædalus Hyperboreus* was completed in 1718, in which year Swedberg transported over mountains and valleys, on rolling machines of his own

invention, two galleys, five large boats, and a sloop, from Strömstadt to Iderfjol, a distance of fourteen miles, in order to forward the siege of Frederickshall. Swedenborg's next literary works were *The Art of the Rules* (an introduction to the Rules) and *Attempts to find the*

places by means of the Moon. In 1719 the family was ennobled by Queen Ulrica Eleonora under the name of *Swedenborg*. From this time he took his seat with the nobles of the equestrian order in the triennial assemblies of the states. In this year he published three works in Swedish: *A*

In 1722 he published anonymously, at Stockholm, a work *On the Depreciation and Rise of the Swedish Currency*. For the next ten years he divided his time between the business of the Royal Board of Mines and his

In 1729 he was admitted a member of the Royal Academy of Sciences at Upsala. In 1733 he again travelled into Germany. S.'s *Opera Philosophica et Mineralia* were published in 1734. This large work consists of three distinct treatises. The first volume contains 'Principles of Natural Philosophy, consisting of new attempts to explain the phenomena of the elemental world in a philosophical manner. The second and third volumes are together called the 'Regnum Minerale'; the second is on iron, the third on copper and brass. In the same year S. published *An Introduction to the Philosophy of the Infinite, and the Final Cause of Creation*. It established his reputation throughout Europe. Christ. Wolff and other foreign literati eagerly sought his correspondence; and the Academy of Sciences of St. Petersburg appointed him a corresponding member. In 1736 he again travelled. The journal of his tour, from 1736 to 1739, is in MS. in the Academy at Stockholm. At this time he applied himself to anatomy and physiology, of a masterly acquaintance with which he gave evidence in his *Oeconomia Regni Animalis*. In 1741 he became a fellow of the Royal Academy of Sciences of Stockholm. He still continued earnest in the pursuit of physiology, and in 1744 published the *Animal Kingdom*, parts i. and ii., at the Hague, and in 1745 part iii. in London. At the beginning of 1745 S. published in two parts *The Worship and Love of God*. S. continued to write industriously on various subjects of natural philosophy, and many of his MSS. are preserved in the Royal Academy of Sciences at Stockholm; but his career may be dated from the publication of the *Prodromus Principiorum*. In this work he attempted to account for chemical combination by a theory of the forms and forces of the particles of bodies, and to resolve chemistry into natural geometry, that it might have the benefit of first principles, and the rank of a fixed science. Of these forms he gave many delineations. In approaching the human body he again insisted on the necessity for principle. A knowledge of the professed object of his search he and 'resolved by the analytic way.' He attempted to combine and reorganise the



EMANUEL SWEDENBORG

Proposal for a Decimal Arrangement of Coinage and Measures, to facilitate Calculation and Suppress Fractions; A Treatise on the Motion and Position of the Earth and Planets; Proofs derived from appearances in Sweden, of the Depth of the Sea, and the greater Force of the Tides in the Earliest Ages. In the spring of 1721 he again went abroad through Denmark to Holland, and published a number of small works at Amsterdam. From Amsterdam he went to Aix-la-Chapelle, Liège, and Cologne, and visited the mines and smelting-works near those

places in 1722. *Miscellaneous Objects, particular and Mountain Strata*; and at Hamburg, during the same year, he published a *con-* *on Metals, Iron, and the* *n's Cavern*. This *ch* preceded it, shows a rare power both of accumulating facts and applying principles.

opinions of all the schools of medicine since the days of Hippocrates. His works, however, are a dead letter to the medical profession. From 1745 S. entirely forsook science, returned from London to Sweden, and devoted himself to the study of Hebrew and the perusal of the Scriptures. He continued to discharge the duties of assessor of the Board of Mines till 1747, when he obtained permission to retire, retaining as a pension the salary of the office. During the remainder of his life, which was passed partly at London and Amsterdam, S. gained many believers in his doctrines among the most distinguished men of the day. Bishop Fellenius and Dr. Ekebon instigated a prosecution against him in the consistory of Göteborg, whence it was transferred to the diet; but S. came out of these trials with safety, unaccused by the diet, and protected by the king. S. died in Great Bath Street, Coldhath Fields, March 29. S.'s theological works are numerous. As a specimen of his interpretation of the Holy Scripture, the reader may consult the *Apocalypse Revealed*; for a concise view of his alleged experiences, the *Heaven and Hell* may be resorted to; for a view of that part of his system which relates to the creation and government of the universe, we recommend the perusal of the *Divine Love* and the *Divine Providence*; for his doctrine concerning the relation of the sexes, and its eternal origin and perpetuity, and for his code of spiritual legislation on marriage and divorce, see the *Conjugal Love*, one of the most remarkable of these works; finally, the student will find a compendium of the whole of the theology of the New Church in the *True Christian Religion*, the last and perhaps the finest of the writings of S. The whole of the theological works, originally published in Latin, have been translated into English, and some of them have passed through several editions both in England and in America. Translations of *Heaven and Hell*; *Divine Love and Wisdom*, and the *Divine Providence* are issued in Everyman's Library. S.'s theological MSS., which are preserved in the Royal Academy at Stockholm, are very voluminous. See Lives by E. Paxton Hood (1854), W. White (1868), E. Swift (1883), Garth Wilkinson (1886), B. Worcester (1907), G. Trobridge (1908); *Documents concerning Life and Character*, edited by R. L. Tafel (1875-77).

Swedenborgians are a sect who follow the teachings of Emanuel Swedenborg. They regard him as a prophet who divulged the doctrine of the church signified by the Apocalypse.

In Gt. Britain they may be divided into two portions, one of which forms the denomination known as such to the world; while the other portion remains without visible separation from the communion of the Established Church. The first public association of the Swedenborgians took place in 1788, in Great Eastcheap, London. Since that time societies have been formed in nearly all large towns in Britain.

Swedenborg Society, The (London), instituted in the year 1910 to translate and publish the works of Emanuel Swedenborg. The society, while seeking more especially to make known to the world Swedenborg's theological writings, publishes also his scientific works, and is entirely unsectarian. It has published works of Swedenborg in eighteen different languages, including Hindi, Arabic, and Japanese, and all the principal European tongues. In collaboration with similar societies in America, it has undertaken the work of making phototype reproductions of the original MSS. of Swedenborg's writings, and copies of these will ultimately be deposited in all the principal libraries of the world. Free grants of the society's theological publications are made to clergymen, ministers, and theological students. Membership of the society is open to all persons interested in its work.

Swedish Movements, systematic gymnastic exercises intended to develop the body, and, more particularly, to cure bodily ailments. The originator of the modern school of Swedish medical gymnastics was Per Henrik Ling (1776-1839), the son of a minister. His health broke down through poverty and hard work, but, having recourse to teaching fencing for a living, he found that the regular exercise brought back his health. He afterwards elaborated a series of movements the practice of which he claimed to be a certain cure for most bodily ills. His claims were probably too extravagant, but the success which followed the teaching of his system by himself and his pupils brought it into good repute. There are now many varying systems based on Ling's. See Cyriax, *Elements of Kellgren's Manual Treatment*; Wildc, *Handbook of Medical Gymnastics*.

Sweepstakes, a gaming transaction, in which one adventurer wins (sweeps) the stakes of himself and others; or a prize in a horse-race made out of several stakes. S. are lotteries, and therefore illegal, but money deposited in the hands of a stakeholder can, in law, be recovered at any time before the money has been actually paid away on the determination of the bet.

Sweet Bay, see LAUREL.

Sweetbread, a name given to certain glands of animals used as food. The pancreas of the ox or calf is most generally employed; it is palatable and digestible when well-cooked, and is more especially suited for invalids.

Sweet Flag, or *Acorus Calamus*, the British species of its genus, which belongs to the Araceæ. The inflorescence has an aromatic scent.

Sweet Pea (*Lathyrus odoratus*), probably the most popular annual garden plant. It lends itself exceptionally to hybridisation, and indeed was, with the edible pea, the subject of Mendel's invaluable experiments. Its numerous varieties cover a very extensive range of colour, though deep blue and most shades of yellow were unknown in 1913. The ground should be well prepared for plants by deep digging, and the seed can be either sown where the plants are to bloom or preferably under glass early in the year, the seedlings being planted out with a good ball of soil and roots about mid-April. Support by means of tall sticks or strings should be given early, and when flowering starts liberal supplies of water and liquid manure and also regular picking of the flowers will prolong the blooming period and increase the beauty of the blooms.

Sweet Potato, *Convolvulaceæ* a. and known *edulis*. tubers, where its tuberous roots are eaten as potatoes.

Sweet William, or *Dianthus barbatus*, a species of Caryophyllaceæ often grown in British gardens on account of its bright flowers.

Swetchine, Madame Anne Sophie (née Soymanof) (1782-1857), was a maid of honour to the Empress Marie-Louise of the French. She married General S. when she was only seventeen. In St. Petersburg she held a brilliant position in the best society of the day, the salon over which she afterwards presided in Paris was permeated with the Catholic and counter-revolutionary ideas of De Maistre. Sainte-Beuve called Madame S. *Les fille cadette de St. Augustin*.

Sweyn I. (d. 1014), King of Denmark, was the son of Harold and the father of the King Canute, who descended on our shores. S. himself led numerous invasions against the Saxons, but his wars were carried on more with a view to extorting money from the English than with the idea of attempting any colonisation of this land. S. came at a juncture in the history of Denmark when

the old northern paganism was softening under the influence of Christianity.

Swieten, Gerard, Baron van (1700-72), a Dutch physician, born at Leyden. He was professor of medicine at the university of his native town, and in 1745 became leading physician at the University of Vienna. His chief work was *Commentaria in H. Boerhaavii Aphorismis de cognoscendis et curandis Morbis*, 1741-72.

Swietenia Mahogani, see MAHOGANY.

Swift, the name of members of the Picarian family Cypselidæ closely allied to the nightjar, cuckoo, and woodpecker, but not to the swallow, a passerine bird to which it bears some external points of resemblance. The only British species (*Cypselus apus*) arrives in Britain in May, but makes a sudden departure in August for its winter quarters. It feeds entirely on small winged insects, and in its search for them exhibits remarkable powers of flight. It nests in holes in tall buildings, laying two or three large white eggs. The adult bird is about 7 in. long. The plumage is blackish brown except for a small greyish white patch under the chin. The tail is long and forked. An occasional visitor to Britain is the white-bellied or Alpine S. (*C. melba*). A remarkable S. is Salvin's S. (*Panytila sancti-hieronymi*), a native of Guatemala, which builds a huge nest composed entirely of seeds and the bird's own salivary secretion. The famous edible nests (*q.v.*) are made by Malayan swifts of the genus *Collocalia* in which the power of secreting saliva is so developed that the nests are composed entirely of it.

Swift, Deane (1707-83), was the cousin of Jonathan Swift. He was educated at Oxford, and took his degree in 1736, and after leaving college settled on his estate at Goodrich in Hertfordshire. He is chiefly remembered for *An Essay upon the Life, Writings, and Character of Dr. Jonathan Swift*, which he published in 1755, but he was also responsible for the volumes containing Swift's correspondence in the large octavo edition of that author's works edited by John Hawkesworth, 1769.

Swift, Jonathan (1667-1745), a man of letters, though born in Dublin, was of English origin. He was educated at Trinity College, Dublin, and in 1692 became secretary to Sir William Temple. He hated his subordinate position, and finding that Temple made no effort to procure him advancement, he went to Dublin in 1694, was ordained, and given the prebend of Kilroot. Securing no church preferment, S., two years later, returned to his old duties at

Moor Park, where young Esther Johnson ('Stella') was now installed as a member of the household. He remained there until Temple's death (1699), when he went to Ireland, and received some minor clerical appointments. He had read deeply, and already in 1697 had written *The Battle of the Books*, which with the still more famous *The Tale of a Tub* was published in 1704. When he came to England in 1705 and 1707 he made the acquaintance of the leading men of letters and statesmen, and gradually became a power with the Tory ministers. His love-affair with Miss Vanhomrigh ('Vanessa') is related in the poem, *Cadenus and Vanessa*, but it was 'Stella' who had the first place in his heart, and his *Journal to Stella* makes very delightful reading. Whether he married her or not is one of the unsolved problems of literary history. In 1713 he was appointed to the deanery of St. Patrick. He wrote many political pamphlets, the most famous of which are the *Drapier Letters* (1724). *Gulliver's Travels* was published in 1726. His last visit to England was paid in the following year, and the rest of his life was spent in Ireland. His brain became overclouded in 1758, and he never recovered his senses. He died in October, and was buried beside 'Stella' in his cathedral. Among his minor works are: *A Meditation upon a Broomstick*; *The Beckerstaff Papers*; *An Essay on Conversation*, and *A Complete Collection of Genteel and Ingenious Conversation*. There is an edition of his works by Scott (1814), and a biography by Craik (1882), and the *Correspondence of Jonathan Swift* (4 vols.), edited by F. Elrington Ball (1913).

Swift, Theophilus (1746-1815), the son of Deane Swift. He was a man of eccentric habits and opinions, and was, in consequence, frequently engaged in unpleasant controversies, one of which led to a duel (1789) and another to imprisonment (1794). He published *The Gamblers*, a poem (1777); *Temple of Folly*, in four cantos (1787); *Poetical Address to His Majesty* (1788); *The Female Parliament*, a poem (1789); *The Monster at Large* (1791); *An Essay on Rime* (1801).

Swiftsure, a British battleship, launched in 1903 at Elswick, has a displacement of 11,800 tons, indicated horse-power of 12,500, and a speed of 20 knots. The name, originally 'Swiftsuer' (swift pursuer) was introduced into the British navy in 1573.

Swilly, Lough, an inlet of co. Donegal, Ireland, entering from the Atlantic between Fanad Point and

Dunaff Head (4 m. in width) and extending inland for 25 m.

Swimming, the art of propelling oneself through water without artificial aid. S. is for man an acquired art, that is, certain movements which are not instinctive, at any rate among civilised peoples, have to be learnt and practised before the aspirant can expect to support himself in the water. By inflating his lungs with air, a man can cause his specific gravity to be about equal to that of water, so that floating without movement is possible. In travelling through the water, a fair proportion of the body is not immersed, so that the displacement of water is lessened: more or less rapid movement is then necessary to prevent the body from sinking. The most generally useful series of movements used in S. is that known as the breast stroke. The arms are pushed out in front of the body near the surface, the fingers being closed and the palms downwards, so that the thumbs nearly touch when at full stretch. The palms are then turned slightly outwards and swept backwards until they are in line with the breast. The hands are then quickly brought to the front of the chest and then thrust forward for the next stroke. While the arms are making the backward stroke the legs are drawn up with the heels touching and the knees pointing sideways. The legs are then kicked outwards, making a wide sweep and brought together when nearly straight, being drawn up again during the next arm stroke. The movements should be vigorous but not jerky, and the joints should not be perfectly rigid during any part of the stroke. Another method of S. is the back stroke, in which the same leg movements are used as in the breast stroke; the arms, however, are brought through the air to a position in advance of the head and then swept round under the water near the surface until they touch the hips. In the side stroke the lower arm makes a deep sweep downwards, the upper arm moves from head to side, and the legs are kicked apart and smartly closed. The over-arm stroke differs in that the upper arm is brought through the air with the hand at the level of the face, the hand dipped in with fingers pointing downwards, and a vigorous push backwards effected with the full breadth of the palm. The trudgen stroke involves pulling each arm clear of the water to get position for each stroke. A modification is the 'crawl,' but in the latter the legs are lifted from the water nearly as far as the knee and then brought

alternately down upon the surface with a sharp shock. S. races are particularly popular in England, Australia, and America. There are championships for many distances and various styles. A mile was traversed by D. Billington, in 1907, in 24 mins. 42½ secs. C. M. Daniels, of America, swam 100 yds. in 55½ secs., a performance which was a great improvement on championship efforts for many years back. Great interest has from time to time been taken in attempts made to swim the English Channel. Captain Matthew Webb accomplished it in 21 hrs. 45 mins. in 1875. The feat was duplicated in Sept. 1911 by T. W. Burgess, who took 22 hrs. 35 mins. to complete a somewhat longer course. See F. Sachs, *The Complete Swimmer*; Sinclair and Henry, *Swimming*; Ralph Thomas, *Swimming*.

Swinburne, Algernon Charles (1837-1909), one of the greatest English poets of the nineteenth century, born in London. His father was Admiral Charles S., second son of Sir John S., Bart., of Capheaton, Northumberland, while his mother was the Lady Henrietta Jane, daughter of the third Earl of Ashburnham; and it is interesting to find that the poet, an ardent republican throughout the greater part of his life, came of a staunch Jacobite stock. For the Swinburnes, like many other Northumbrian families, played a considerable part in the rising on behalf of the Chevallier de St. George in 1715; nor did the poet's democratic fervour prevent him from taking a certain pride in this, and in *Jacobite Song* he mirrors with singular happiness the impassioned loyalty felt of old by the partisans of the Stuarts. As a boy S. lived sometimes at Capheaton, yet more frequently at East Dene in the Isle of Wight, while in 1852 he went to Eton, and five years later he proceeded to Balliol College, Oxford, where he remained for three years. He left without a degree, however, the reason probably being that, like most young men of marked individuality, he never became interested in the official curriculum; yet he did not leave the university without laurels, for in 1858 he won the Taylorian prize for French and Italian, while already he was known as a promising writer. When still in his teens he had contributed verses to *Frazer's Magazine*, and during his Balliol days he wrote a few things for a collegiate journal, *The Dark Blue*, notably a fine essay on Simeon Solomon; while he also wrote both in prose and verse for another Oxford periodical, *Undergraduate Papers*,

which was edited by John Nichol, afterwards a professor at Glasgow University. But a more important event which crossed the poet's path at this time was his meeting with Rossetti, who had come to Oxford to do some mural painting there; and a close friendship was speedily formed between the two, while it was to Rossetti that S. dedicated his first volume of poetry, *The Queen Mother* (1860). When travelling in Italy, shortly after leaving Oxford, S. had the good fortune to meet Landor; but soon the young poet was back in England, and on going to live in London his intimacy with Rossetti began to deepen apace. The latter painted his portrait, while in 1862 the two friends, along with George Meredith and Rossetti's brother, William, took a house together at Cheyne Walk, Chelsea. Meanwhile the poet's pen was busy, and in 1865 he issued his memorable tragedy, *Atalanta in Calydon*, while the following year was marked by the publication of his *Poems and Ballads*. This book raised a storm of abuse from many critics, these being repelled by the sensuality which they declared characterised its pages; yet all were forced to admit the new singer's lofty skill, and henceforth his reputation was *unfailingly accomplished* in the world of letters; while it soon transpired that he was destined to be one of the most prolific of English writers, for now volume after volume of poetry came from his hand, and also a host of notable contributions to critical literature. S.'s great vivacity as a young man was admired by many of his friends, and a fine record of this trait in his character consists in the portrait of him by Watts, now in the National Portrait Gallery. But in general his life was a comparatively uneventful one, its tenor broken only by occasional trips to the continent and by the publication of his books; while he always shunned popular applause and only spoke in public once, the occasion being a dinner of the Royal Literary Fund, where he replied to the toast of 'The Imaginative Literature of England.' When the home at Chelsea was broken up, he went to live in chambers in North Crescent, while in 1879 he removed to Putney, taking a house there along with Mr. Theodore Watts-Dunton; and here he lived chiefly until his death, which occurred on April 10, 1909. Fourteen years prior thereto a third likeness of him had been done—a red chalk drawing, the work of Mr. Will Rothenstein, and this was acquired lately by the Dublin Gallery

of Modern Art, while the portrait by Rossetti, cited above, is now in the possession of Lady Battersea, London. S.'s voluminous prose work includes two stories, *Dead Love* and *Love's Cross-Currents*, but he had slender skill as a teller of tales, and it is on his critical studies that his fame as a prose author really rests.

S.'s collected poems were issued in 1904, and his collected dramas in 1905 and 1906. The following are the more important of his prose works: *William Blake*, 1868; *Essays and Studies*, 1875; *A Note on Charlotte Brontë*, 1877; *A Study of Shakespeare*, 1880; *Miscellanies*, 1886; *A Study of Victor Hugo*, 1886; *Studies in Prose and Poetry*, 1894; *The Age of Shakespeare*, 1908. See also W. M. Rossetti, *Swinburne's Poems and Ballads*, 1866; T. Wratlaw, *Swinburne* (English Writers of To-day), 1900; G. E. Woodberry, *Swinburne* (Contemporary Men of Letters), 1905; Edward Thomas, *Swinburne: a Critical Study*, 1912; and John Drinkwater, *Swinburne: an Estimate*, 1913.

Swinburne, Henry (1743-1803), a traveller, born at Bristol. After the death of his brother in 1763 he visited Italy and learned the language, and in 1774 went to the Pyrenees and travelled through Spain, publishing *Travels through Spain* in 1779. He next visited the two Sicilies (1777 and 1778), and on his return journey touched at Vienna, Frankfurt, and Brussels. He was again in Vienna and Italy in 1780, and stayed in Paris, 1786-88. Besides the work mentioned above, he published *Travels in the Two Sicilies*, and both of his books were illustrated with excellent plates. His letters were published posthumously under the title of *The Courts of Europe at the Close of the Last Century*.

Swindling, see FRAUD.

Swindon, a market tn. and municipal bor. of Wiltshire, England, 28 m. from Bath and 77 m. from London. It is made up of two parts, Old and New S., the latter having grown up around the locomotive department and workshops of the G.W.R., which were established in 1841. It is an important railway junction. Pop. (1911) 50,771.

Swineford, a market tn., co. Mayo, Ireland, near the R. Moy, 15 m. N.W. of Ballyhaunis. Pop. (1911) 1400.

Swinemünde, a seaport and tn., Pomerania, Prussia, on the island of Usedom, 35 m. by rail N.N.W. of Stettin, is well fortified and an important shipping centre. It was the port of Stettin before the deepening of the R. Oder (1900-1). Pop. 14,198.

Swineshead, a tn. and par. of Lincolnshire, England, 6 m. S.W. of Boston by rail; has many interesting remains and an endowed free school. Pop. (1911) 1800.

Swinton: 1. A tn. of the W. Riding of Yorkshire, England, 10 m. N.E. of Sheffield; has railway works, and manufactures pottery, glass, and bottles. Pop. (1911) 13,658. 2. A tn. of Lancashire, England, 5 m. N.W. of Manchester. Pop., with Pendlebury (1911), 30,759.

Swiss Guards, a famous regiment of Swiss mercenaries in the French army, constituted in 1616. They were conspicuous for their bravery in the defence of the Tuileries (1792), which was commemorated in 1821 by the great lion outside one of the gates of Lucerne.

Switch: 1. In electricity, a mechanism for making or breaking a circuit, or for transferring a current from one conductor to another. 2. On a railway, a device for moving a small section of track so that rolling-stock may be run or shunted from one line of track to another.

Switchback was originally a term applied to a railway which modified the steepness of a declivity by progressing alternately in each lateral direction as well as in the vertical direction up the slope. The railway, which was used for carrying coal, in which the trucks were carried down inclines by their own weight and assisted up the inclines by a stationary engine, was afterwards called a switchback railway. Still later the name was given to the elevated railways at exhibitions, fairs, etc., in which the cars are hauled up to a height by a cable, and then descend gradually, though rapidly, by a series of sharp ascents and descents. In this signification 'switchback' is still used, although such names as 'scenic' or 'mountain' railways are more popular.

Swithin (or Swithun), Saint (d. 862), Bishop of Winchester, was probably a secular clerk. He was the adviser of Egbert and tutor to his son Ethelwulf, who made him bishop of Winchester on his accession (852). His body having been buried outside the church at Winchester, the monks determined to place it inside the newly erected cathedral (971), but were prevented from doing so by rain, which did not cease for forty days. Hence the popular superstition that if it rains on St. Swithin's Day (July 15) it will rain for forty days.

Switzerland, a republic of Central Europe, the only country on the continent without any seaboard (if we except the principality of Liechtenstein, the grand-duchy of Luxem

burg, and the small republic of Andorra), consists of the confederation of twenty-two self-governing cantons, bounded on the N. by Germany, W. by France, E. by Austria and Liechtenstein, and S. by Italy. It is 220 m. in length from E. to W., about 137 m. from N. to S., and is separated from the adjacent countries by the Alpine barriers. Fifteen of the cantons are German-speaking, five speak French, while one (Ticino) speaks Italian and one (Grisons) speaks Italian and Roumansch. In 1910, out of a total population of 3,741,971, 2,599,151 spoke German, 796,244 French, 301,325 Italian, and 39,834 Roumansch. The following table gives the names of the cantons, the date of their entry into the Confederation, and the density of the population per square mile, while the initials, G., F., I., or R., indicate which language is spoken—

CANTON	Date of Entry	Area	Pop. in 1910	Pop. per sq. m.
Zürich, G.	1351	666	500,679	751.7
Bern, G.	1353	2,657	642,744	249.1
Luzern (Lucerne), G.	1332	597	166,782	288.0
Uri, G.	1291	415	19,700	53.1
Schwyz, G.	1291	351	58,347	166.2
Unterwalden—				
Upper, G.	1291	183	17,118	93.5
Lower, G.	1291	112	13,796	123.1
Glarus, G.	1352	267	33,211	124.3
Zug, G.	1352	92	28,013	304.5
Fribourg (Freiburg), F., G.	1481	644	139,200	216.1
Solothurn (Soleure), G.	1481	302	116,728	386.5
Basel (Bâle)—				
Town, G.	1501	14	135,546	9681.5
Country, G.	1501	163	76,241	467.7
Schaffhausen, G.	1501	114	45,943	403.0
Appenzell—				
Outer, G.	1513	101	57,723	572.0
Inner, G.	1513	61	14,631	239.8
St. Gallen (St. Gall), G.	1803	779	301,141	385.0
Grisons (Graubünden), I., R.	1803	2,773	118,262	42.6
Aargau (Argovie), G.	1803	542	229,850	424.0
Thurgau (Thurgovie), G.	1803	381	134,055	351.8
Ticino (Tessin), I.	1803	1,088	158,556	145.7
Vaud (Waadt), F.	1803	1,244	315,428	253.4
Valais (Wallis), F., G.	1815	2,027	129,579	63.9
Neuchâtel (Neuenburg), F.	1815	312	132,184	423.6
Genève (Genf), F.	1815	108	154,159	1427.3
Total		15,976	3,741,971	234.8

S. probably exceeds every other country on the globe in the diversity of its scenery, including as it does vast snow-capped mountains, with abyssal depths and enormous glaciers, which form a distinct contrast to the grassy valleys, the wooded upland slopes, the vineyards, the rich cultivated fields, the expansive beautiful lakes, and the streams. On its pasture land thousands of cattle are reared and fattened, while the ibex and chamois roam among the rocky crags and woods. The chief physical feature is the vast Alpine system, known by various names in different localities, e.g. the Jura Mts. extend along the W. boundary; the Rhaetian Alps cross the E. frontier into the Tyrol; the Bernese Alps occupy the south-cen-

tral part of the country; the Valais Alps lie on the southern border; the Lepontine Alps, the Rheinwald Alps, and Glarner Alps are situated in the S.E.; while the Urner Alps are in the centre of the country. The highest peak is Monte Rosa, on the Italian frontier which is 15,217 ft. above sea-level. The highest mountain being only exceeded in Europe by Mont Blanc and certain peaks in the Caucasus Mts. The principal passes over the Alps are Mont Cenis, leading to Savoy; the St. Bernard, leading from the canton of Grisons to the Vald'Aosta; the Simplon, crossing the Alps and leading to the du St. Gothard, and several others, the principal being the Simplon, the

St. Gothard, the Lötsehberg (opened 1913), and the Semmering. Light railways ascend many of the peaks, the Jungfrau railway running to the summit (13,248 ft.) from a height of 6770 ft. There are upwards of 1000 glaciers in S., the largest being the Aletsch in the Bernese Oberland, 13 m. in extent, which descends from the slopes of the Aletsehorn (13,721 ft.) to about 5450 ft. Of the many beautiful lakes within, or partly within, the limits of the country, the following are the most important: Geneva (224 sq. m.), Constance (208 sq. m.), Neuchâtel (92 sq. m.), Lago Maggiore (84 sq. m.), Lucerne (44½ sq. m.), Zürich (34 sq. m.), Lugano, Thun, Bienne, Zug, Brienz, and Morat, the last six being under 20 sq. m. in extent. The principal rivers of S. are the Rhone, Rhine, Inn, Arve, Reuss, Limmat, Aar, and the Thur, the Aar being the most important entirely within Swiss territory. The three rivers first noted have their sources in the Alpine glaciers: the Rhine flowing N. and N.W. empties into the North Sea, the Rhone takes an E. and then southerly course to the Mediterranean, while the Inn flows N.E. to join the Danube. Among the valleys may be mentioned the famous Val de Travers and the valley of the Inn or the Engadine. There are grand waterfalls at Staubbach in the canton of Bern, which drop 980 ft., and at Schaffhausen on the Rhine, which drop over 100 ft. in three leaps. The forests of S. cover 3290 sq. m., most of them belonging to municipalities and other corporations, and about 30 per cent. belonging to private individuals. The chief towns, with their pops., are Zürich (189,088), Basle (131,914), Geneva (125,520), Bern, the cap. (85,264), Lausanne (63,296), St. Gall (37,657), Chaux-de-Fonds (37,626), and Lucerne (39,152).

The present formation of the mountain masses of S. is the result of extreme pressure at successive periods from the N.E. and S.W., which has caused the upheaval of the earth's crust, in the course of which the strata have been crumpled, shattered, and even overturned, presenting an endless variety of shapes. The lofty ridges consist principally of crystalline schists in conjunction with granite, the outliers containing fossiliferous sedimentary rocks.

As regards religion, there is full liberty of conscience and of creed, and no man is required to pay taxes to maintain any religion to which he does not belong. Jesuits and their affiliated societies are barred, and the foundation of new religions, orders, or convents is not allowed. In 1910 the Protestants numbered 2,108,590,

Catholics 1,590,792, and Jews 19,023. The Protestants are in the majority in the cantons of Zürich, Bern, Vaud, Neuchâtel, and Basel, while Catholics predominate in Fribourg, Valais, Ticino, and the Forest cantons. In all the cantons education is compulsory and free. There are 996 infant schools, with 1206 teachers and 50,842 pupils; 4690 primary schools, with 11,887 teachers and 522,383 pupils; 636 secondary schools, with 1961 teachers and 53,773 pupils; 41 middle schools, with 915 teachers and 13,477 pupils; and 49 normal schools (public and private), with 577 teachers and 3399 pupils. In addition to these there are commercial schools, industrial schools, improvement schools, technical schools, and schools of agriculture, horticulture, dairy management, domestic economy, and viticulture. S. has seven universities, which are more or less modelled on those of Germany, with four faculties— theology, law, medicine, and philosophy—governed by a rector and a senate. The Basel University was founded in 1460, Zürich in 1832, Bern in 1834, Geneva first as an academy in 1559 and then as a university in 1873, Fribourg in 1889, Lausanne (academy 1537) in 1890, and Neuchâtel (academy 1866) in 1909. Fribourg and Neuchâtel universities have no faculty of medicine.

S., although chiefly an agricultural country, cannot grow enough crops to support its population, so that the majority of the food stuffs are imported. The productive land is cut up among some 300,000 peasant proprietors, who raise rye, oats, barley, and potatoes, and manufacture cheese, condensed milk, wine, and tobacco. Nearly 30 per cent. of the entire area is unproductive. Stock-raising is extensively engaged in, mainly horses, cattle, sheep, goats, and pigs. Bee-keeping is a thriving industry. There are five salt-mining districts—at Schweizerhalle, Rheinfelden, Ryburg, Kaiser-augst, and Bex; cement works in the Val de Travers; and numerous breweries and distilleries. Among other manufactures are silk and cotton goods, clocks and watches, chemicals, embroidery, boots and shoes, motor cars and machinery. In 1912 the exports amounted to £54,303,866, and the imports were valued at £78,549,416. It is estimated that tourists bring £4,000,000 into the country annually.

The national militia is the defending force of S., and service in it is universal and compulsory. The total number of men that could be put in the field against a possible invader is about 280,000 men all told, this number including 66,500 men of the organised landsturm. Liability to

serve in the army extends from the seventeenth to the end of the forty-eighth year. The fortifications of St. Maurice and the St. Gothard Pass are being strengthened, £220,000 having been granted for this purpose in 1910. The money spent annually on the army amounts to £1,720,000. The revenue in 1912 was estimated at £3,710,400, and the expenditure at £3,863,200, and the public debt of the confederation stands at about £5,000,000.

There are 3131 m. of railway in S., including 1494 m. of Swiss lines, 42 m. of foreign lines, the balance being made up by secondary lines and tramways. The post, telegraph, and telephone arrangements are complete and satisfactory. The new National Bank (opened 1907) will eventually have the sole privilege to issue Swiss bank notes, other banks being allowed a period of three years in which to call in their outstanding issue. Each canton possesses its own judicial system of civil and criminal procedure; the High Court, called the *Bundesgericht* or Federal Tribunal, sits at Lausanne, and has final jurisdiction in suits between the Confederation and the cantons.

Legislative and executive authority are embodied in a parliament consisting of two chambers—a National Council and a State Council—the former consisting of 167 members directly chosen by the people in general election, and the latter composed of 44 members (two for each canton), whose election and term of office depend on the individual canton. All representatives, either of the national or state councils, are remunerated, the national members being elected every three years. Three of the cantons are sub-divided—Basel, Appenzell, and Unterwald—but each sub-division is represented by a member in the state council.

History.—The original inhabitants of S. were the Helvetii in the north-west and the Rhaetians in the south-east. The Roman conquest of these tribes began as early as 107 B.C., in which year they were defeated in Southern Gaul. Their subjection dates from 58 B.C., when Julius Cæsar acquired their dominions and organised them as a Roman province. Christianity was introduced between 300 and 400 A.D. The ancestors of the modern Swiss are the Germanic tribes who began to overrun the Roman empire. The Alemanni settled E. of the Aar about 406 A.D., and the Burgundians in the S.W. in 443 A.D. The German peoples became Christians about 600-650, but the Helvetii were not converted till somewhat later. Between 700 and 1200 S. was under the

influence successively of the descendants of Charlemagne, the German emperors, and the Zähringen dynasty. Charlemagne (768-814) included S. in his territory, and ruled over it with the same firm and just sway as he did the rest of his domains. At his death this realm fell into confusion, and in the subsequent partition of his territories half of modern S. was allotted to the E. Frankish kingdom, and half to Lorraine. In 888 Rudolf the Guelph founded the kingdom of Burgundy, and in 917 Alamanni became an independent duchy. In 1038 Burgundy, Alamannia, and Rhaetia fell to the Salic king, Henry III. From 1097 till 1218, the Zähringen dynasty ruled well and justly. A period of anarchy ensued, till in 1273 Rudolf of Hapsburg became emperor. On his death, in 1291, the First Perpetual League of the three Forest States (Uri, Schwyz, Unterwalden) was formed. In 1332 Lucerne, in 1351 Zürich, in 1352 Zug and Gorus, in 1353 Bern, were added to the League, following on a war with Austria. In 1415 war with Austria was renewed, and Aargau was added to the Confederation. From this period dates the rise of Swiss education, art, and industry. From 1474-77 the Confederation were engaged in war with Charles the Bold of Burgundy, defeating him at Granson and Morat (1476). In 1481 Freiburg and Solenne came into the Confederation. In 1499 Maximilian attempted to bring S. again under the empire, but was defeated. The independence of S. really dates from the Confederation of the Thirteen States (*see above*). The Reformation led to internal dissension, as the N. generally followed the teachings of Zwingli (and later of Calvin), while the Forest States remained Roman Catholic. The war which broke out in 1531 settled the relative boundaries of the states owning the two creeds. In 1536 Bern took the Vaud from the Dukes of Savoy. In 1648 S. was acknowledged by the Powers as an independent state. The history of the 17th and 18th centuries is one of a patrie in Bern, Freiburg, Solenne, and Lucerne, and of civic oligarchies in Basel, Zürich, and Schaffhausen. During the whole of this period the peasantry were much oppressed, and their attempt in 1653 to secure better conditions crushed. S. shared, however, in the *éclaircissement* movement in France; but on the outbreak of the French Revolution (1798) it was seized by France. In 1815 its independence was restored, with a constitution known as the Federal Pact. During the 19th century religious differences led to bitter controversy and to blows. In 1847 a savage war

broke out between Protestants and Roman Catholics on the question of the suppression of the Catholic Sonderbund. In 1848 a new federal constitution was adopted, and the terms of peace signed, giving the Protestants nearly all they had fought for. In 1874 a Federal revision was carried, and in 1891 a demand for popular initiative for measures was carried. In 1908 S. entered into an international convention for compulsory arbitration at the court of the Hague. (See Herg and Stead, *History of Switzerland*, 1890; Dändliker, *Short Hist. of Switzerland*, 1899.)

Literature.—Swiss literature, coming as it does from a number of races unconnected in origin and history, must be regarded rather as a collection of local literatures than as one single thing. Ekkehard's *Waltharilied* (c. 940) is a poem in Latin hexameters which deals with Walter of Aquitaine. Of mediæval Swiss literature we have French and German 'courtly' romances on 'France, Britain, and Rome the great'; German lyrics; translations of the Bible into French; miracle and morality plays in French; and vast compilations like Grandson's *Miroir du Monde*. The Swiss reformers and humanists are responsible for much valuable work. Zwingli (1484-1531) translated the Bible into German, while the clear and incisive polemical style of Calvin (1509-64) has raised him to a high place among French stylists. Scaliger is famous as a scholar. Among poets of the same epoch should be noted Gengenbach (who wrote German) and De Bèze (who wrote French), and among German chroniclers Stumpf and Bullinger. For a time Swiss literature declined, but in the 18th century came a reawakening. The works of Crouaz and Ruehert, and Muralt's *Letters on the English and French* (in French) are signs of this new spirit. The philosopher Haller was a sturdy upholder of England in intellectual matters, and was much influenced by the inductive method of Bacon. He published, in 1732, in German, an *Essay on Swiss Poetry*, and his own poems are full of grace and tenderness. Along with him should be mentioned Bodmer, who translated Milton into German (1732). The greatest name of all in Swiss literature is that of J. J. Rousseau (1712-88) (*q.v.*), whose work does not call for treatment here. His disciple, Pestalozzi, is one of the greatest of educational reformers. Vernet (1797-1847) is the 'Protestant Pascal.' His works (in French) are marked by incisiveness and purity of style. The novels of 'Gottlieb' (Albert Bitzius, 1797-1854) rank among the best works of

domestic fiction in German, and his greatest successor as novelist was Edward Rod, who wrote in French. Keller (1819-90) is one of the greatest of Swiss humorists and poets. He wrote in German, as did C. F. Meyer, also a poet. There are also many contemporary Swiss poets and novelists. Of novelists we may note Monnier, Tissot, Combe, and Rannez, and of poets Tazan, Cougnard, Dalcroze, all of whom write in French. (See Rossel and Jenny, *Hist. de la Litt. Suisse*, 1910.)

Sword (A.-S. *sweard*; Dutch *swaard*; Low Ger. *sweerd*; Dan. *sverd*, a sword, allied to the Sanskrit *garu*, a spear or dart), an offensive weapon, having a long metal blade (usually made of steel), either straight and with a sharp point for thrusting, as the rapier; with a sharp point and one or two cutting edges for thrusting and striking, as the broadsword; or curved with a sharp convex edge for striking, as the scimitar; or a broad, short blade with a slightly curved point, as the falchion. Sabres, used by dragoons, are heavy Ss. used chiefly for cutting. Sailors use the cutlass, which is a broad, straight S., about 3 ft. in length. The blade is fitted into a handle or hilt, which is protected by a guard. The hilt has, in various countries and through the ages, assumed a variety of shapes, either bejewelled, ornate, or plain. The blade is carried in a sheath or scabbard to prevent the weapon doing harm when not in use. The earliest Ss. found were fashioned of stone or bronze, somewhat dagger-like in appearance. These were followed by Ss. of iron, short at first and lengthened later. The ancient Britons used Ss. of enormous length and weight.

Sword-fish, or *Xiphias gladius*, the name given to the single species of the mackerel-like family Xiphiidæ. Its distribution is practically universal, but it is found most commonly off the shores of N. America, and only occasionally occurs round the British Isles. The average size of the fish is 7 ft., but in some cases it attains a length of from 12 to 15 ft. It is peculiar in possessing an elongated snout formed from the upper jaw, and with this sword-shaped weapon it can pierce through the planks of ships or spear its prey, such as mackerel and herring. A very different fish, *Belone vulgaris*, a member of the family Scombresoidæ, is also known as the sword-fish.

Swords, a tn. in the co. and 8 m. N. of the city of Dublin, on the Swords R.; has ruins of a tower and abbey. Pop. (1911) 1900.

Sybaris, a celebrated Greek tn. in

Lucania, situated between the rivers Sybaris and Crathis at a short distance from the Tarontine Gulf. It was founded 720 B.C. by Achæans

suburb of Christchurch (q.v.), in Selwyn co., South Is., New Zealand. Pop. less than 10,000.

Sydenham, Charles Edward Poulett-Thomson, first Baron (1799-1841), an English statesman. At the age of sixteen he was placed in his father's business at St. Petersburg, but in 1824 he returned to England, where he assumed chief management of the London business. Sanguine and ambitious, S. set his heart upon entering public life, he became M.P. for Dover in 1826, and his rise from this date was very rapid. M.P. for Manchester many times from 1832; president of Board of Trade, 1834; governor of Canada, 1839; and raised to the peerage, 1840. His *Memoirs* have been written by his brother, Mr. Poulett Scrope.

Sydenham, Floyer (1710-87), an English classical scholar, was finally defeated by the popular indifference to learned works in his life-long struggle to achieve a complete English translation of Plato. For he died, his task still uncompleted, in a debtor's prison, the victim of a victualler's suit. The London Literary Fund Society was founded with the object of averting similar tragedies in the future.

Sydenham, Thomas (1624-89), an English physician, was born in Dorsetshire, and admitted a commoner of Magdalen Hall, Oxford, in 1642. About 1648 he obtained a fellowship of All Souls' College. Subsequently he quitted Oxford, and having taken the degree of doctor of medicine at Cambridge, he became a licentiate of the College of Physicians, and settled in London. In 1666 S. published his first work, which consisted of observations upon fevers. An enlarged edition of this treatise appeared under a new name in the year 1675. Remarks on the epidemic diseases of London from 1675-80, a treatise on dropsy and on the gout, and a tract on the rise of a new fever, were his principal other publications. His works were translated by Dr. Swan; the best edition of it is that of Dr. Wallis, published in 1789.

Sydney: 1. The largest city of Australia, cap. of New South Wales, situated on the S. side of Port Jackson and the E. shore of Darling Harbour, about 4 m. from the Pacific Ocean. Its extensive frontage is occupied by wharves and quays, where the largest ocean-going steamers can be accommodated, facilities which have made it a seaport in the city is well imposing edifices and substantial business houses. Among them may

so notorious for their love of luxury and pleasure that their name was employed to indicate any voluptuary.

Sybel, Heinrich von (1817-95), a German historian, held the chair of history successively at Bonn (1844, 'privatdocent' in 1841), Marburg (1846), Munich (1856), and from 1861 till 1875 again in Bonn. No better acknowledgment of his debt to Ranke, his master, can be found than his own critical and soberly impartial *Geschichte des ersten Kreuzzuges* (1841) and *Geschichte der Revolutionzeit, 1789-1800* (1853-58 and 1872-74). His *Begründung des deutschen Reiches durch Wilhelm I.* (1889-94) is a monumental work.

Sycamine, a tree mentioned in Luke's gospel, is usually considered to be the black mulberry, or *Morus nigra*.

Sycamore (*Acer pseudo-platanus*), a handsome spreading tree (order Acerineæ), introduced into Britain in mediæval times and now thoroughly naturalised. It bears large five-lobed serrate leaves and pendulous racemes of green flowers, followed by reddish-green winged seeds (Samaras). The wood is white and fine-grained, and is much used by turners. The tree is often planted on account of its rapid growth to form a screen for valuable fruit trees.

Sycophant (Gk. *συκοφάντης*), literally, an informer concerning the sacred figs (from *σῦκος*, fig, and *φάντης*, any one who made something known, from *φαίειν*, to see or discover). The Athenians had a law which punished by death those who stripped the figs from the fig trees consecrated to Minerva, while people who informed on such malefactors were rewarded. It became the custom for evil-doers to steal these figs themselves and then accuse those whom they wished to injure. Hence, by a figure of speech, the term S. grew to mean any one guilty of a hypocritical or blackmailing offence. It is thought in some quarters that the penalties attaching to dealing with figs in Athens were due to exorcise and *ocroi* considerations rather than to religious motives.

Sycosis, an inflammatory disease of the hair follicles, characterised by papules and pustules. See RINGWORM.

Sydenham: 1. A dist., S. of London, partly in the metropolitan bor. of Lewisham, 6 m. S.S.E. of St. Paul's. in Kent, England. 2. A southern

be mentioned St. Andrew's Cathedral, St. Mary's Cathedral (Roman Catholic), the university, the town hall, Government House, etc. The university was founded in 1850, is subsidised by the government, and, with the addition of special grants, receives £18,000 per annum towards its upkeep. It is attended by about 1400 students, and there are affiliated to it theological colleges and a college for women. The older portions of the city are being demolished, to be replaced by wider streets and handsome buildings. S. is a naval station of the first class, with dockyards, victualling yards, and coaling depôts. On Garden Is. a well appointed naval establishment has been erected. Other islands in Port Jackson are Shark Is., used as a quarantine station, Spectacle and Goat islands, depôts for explosive stores, Clark Is., a popular watering-place, and Cockatoo Is., with extensive dockage accommodation. The city is embellished with several fine parks and other open spaces, the principal being the Domain, Centennial, Moore, Belmore, and Wentworth parks, and the Botanical Gardens. The south shores are indented by numerous bays, whose waters are filled with shipping from all parts of the world. Over 7,000,000 tons of shipping entered and cleared at S. in 1910. The industries include besides minor manufactures, the manufacture of textiles, steel, and iron goods, machinery, coaches, etc., but S. is primarily a commercial centre. Pop. (with suburbs and shipping) 636,355. S. was founded by Captain Arthur Phillip, who had been sent to Australia to establish a penal colony. He landed at Botany Bay in 1788, but finding it unsuitable for settlement, he proceeded to Port Jackson, where he formed the nucleus of what is now the premier city of the Commonwealth. 2. A tn. and seaport of Capo Breton Is., Canada, 18 m. N.W. of Louisburg. It is the centre of a coal-mining region, with foundries, blast furnaces, coke ovens, and gasometers. The International Railway has its terminus here. Pop. 17,617.

Sydney, Algernon, *see* SIDNEY.

Syene, ancient name for Assuan (q.v.).

Syenite, a plutonic, granitoid, igneous rock (sub-acid), named after Syene, in Upper Egypt, from where it was obtained for ornamental or architectural purposes. It differs from granite in the absence of quartz and the replacement of mica by hornblende. Ss. are not largely developed in Britain, but are found in Norway and Sweden, the Tyrol, and U.S.A., etc. Special types receive special

names, thus: borolanite (leucite S.) and laurvikite (augite S.), which occurs in S. Norway and also near Madras in India. In the Tyrol the augite Ss. are termed monzonites.

Sylburg, Friedrich (1536-96), a German classical scholar, was a farmer's son. At Frankfurt (from 1583) and later at Heidelberg (from 1591) he brought out wonderfully accurate editions of Greek texts, among them being editions of Aristotle, Herodotus, Pausanias, Dionysius of Halicarnassus, Justin the Martyr, Xenophon, and of ancient historical writers (*Romanæ Historiæ Scriptores*).

Sylhet, the cap. of a dist. of its own name, Assam, India, on the Surma R., 49 m. S. of Shillong, with various manufactures. Pop. 15,000. The dist. is 5400 sq. m. in area, with a pop. of 2,250,000.

Syllabub, a culinary preparation, formerly much more used than at present. It consists of sugar and cream flavoured with brandy, sherry, and lemon rind and juice, worked into a froth, and served up in that state in glasses.

Syllabus, Papal, the name given to two lists of heresies and errors condemned by Papal authority. The better known is the syllabus of Pius IX. (1864) which condemned no less than eighty errors dealing with almost every department of modern thought. The syllabus of Pius X., the decree *Lamentabile sine exitu*, was issued in 1907, and condemns the chief tenets of modernism in sixty-five theses. This syllabus is supplemented by the encyclical *Pascendi gregis* of the same year, and by the oath against modernism fixed in 1910.

Syllogism (σύν, together, λόγος, thought, i.e. the joining together in thought of two propositions), 'the act of thought by which from two given propositions we proceed to a third proposition, the truth of which necessarily follows from the truth of these given propositions' (Jevons). The two first propositions in the S. are called the *premises* and the last the *conclusion*, e.g. mercury is not solid, mercury is a metal; therefore some metal is not solid. The three propositions of a S. are made up of three ideas or terms, called the *major*, the *minor*, and the *middle*. The subject of the conclusion, which necessarily follows from the premises, is called the *minor term*; its predicate is the *major term*, and the middle term is that which shows the connection between the major and minor terms in the conclusion. Ss. are sometimes divided into single, complex, conjunctive, etc., and sometimes into categorical, hypothetical, conditional, etc. The special rules of the S. are

(1) Every S. has three, and only three, terms. (2) Every S. contains three, and only three, propositions. (3) The middle term must be distributed (i.e. taken universally) once at least, and must not be ambiguous. (4) No term must be distributed in the conclusion which was not distributed in one of the premises. (5) From negative premises nothing can be inferred. (6) If one premise be negative, the conclusion must be negative; and *vice versa*, to prove a negative conclusion one of the premises must be negative; and no corollaries from the above. (7) From two particular premises no conclusion can be drawn. (8) If one premise be particular, the conclusion must be particular (Jevons). The quantity and quality of propositions, in logic, are marked by arbitrary symbols, as A, E, I, O; and every assertion may be reduced to one of four forms—the universal affirmative (A), the universal negative (E), the particular affirmative (I), and the particular negative (O). From these, by combination, all Ss. are derived. To remember the figures certain curious words are used by logicians; thus, under the first figure we find Barbara, Celarent; under the second, Camestres, Baroko; and under the third, Bokardo, Feriso. Each of these represents a mood, i.e. the designation of propositions of a S. accord quantity and quality. A had S., with one of the premises implied only, is the first resource of fallacy.

Sylphs are explained by Paracelsus as elemental spirits of the air, just as the salamanders are of fire and the nymphs of water. By nature they are half fairy and half mortal. Perhaps Pope's description of them in his skilfully contrived *Rape of the Lock* is responsible for the word 'sylph' being used of a slender, graceful maiden.

Sylt, a N. Frisian is., forming part of the Prussian prov. of Schleswig-Holstein. It is the largest of the group, having an area of 38 sq. m. Its chief tn. is Westerland, a noted holiday resort on the W. coast, which attracts many visitors in the summer. Pop. 3000.

Sylva, Carmen, see ELIZABETH, PAULINE ELIZABETH OTTILIE LOUISE.

Sylvester, James Joseph (1814-97), an English mathematician, born in London, educated at Cambridge. He taught at University College, London, in the University of Virginia, in the John Hopkin's University, at Woolwich, and at Oxford, and published numerous memoirs and papers.

Sylvester, Joshua (1563-1618), a poet. He seems to have lived a wandering life as an unsuccessful

merchant, and to have died in Holland. His translation of the *Divine Weeks and Works* of Du Bartas had at one time a great reputation. His *Collected Works* were published in 1611, and reprinted in the Chertsey Worthies Library, 1878.

Sylvester I., Pope (b. c. 270), the son of Rufinus and Ste. Juste. He was ordained priest at the age of thirty. During his occupation of the papal throne the heresy of Arius disturbed the church. He was the first pope to be represented wearing the triple crown.

Sylvester II. was of obscure origin. He was enthroned pope on April 2, 999. He obtained from the emperor on his accession letters attesting the temporal power of the Holy See. S. II., or Gerbert, has left many writings and was a man of much learning.

Sylvester III., antipope, was raised to the papal dignity by Ptolemy in place of Pope John, deposed for the licentiousness of his life.

Sylviadæ, see WARBLERS.

Sylviculture, see ARBORICULTURE and FORESTRY.

Sylvine, or Sylvite, a naturally occurring form of potassium chloride, found at Stassfurt in Prussia and round the fumaroles of Vesuvius. It is soluble in the cubic system, is colour and soluble in water 2, sp. gr. 1.9).

Sylvius, Jacobus (the Latinised name of Jacques Dubois), (1478-1555), a French anatomist, began to lecture on anatomy at the Royal College, Paris, when he was already over fifty years old. His lectures were mere expositions of his master, Galen, and were only rarely enlightened by practical demonstrations from the human frame.

Symbiosis, or Mutualism, an intimate relationship between separate organisms, one of which may have been originally parasitic on the other, but by modification the two have become able to live together and derive mutual benefit from each other's presence. Each lichen is a combination of a fungus and one or more kinds of algae, living in active partnership. S. exists between a fungus and certain rye-grasses, the mycelium being vegetatively perpetuated in the seed of the plant and not by spores. Infected plants are found to be more vigorous than uninfected ones. Leguminous plants and nodulo bacteria are in symbiotic relationship, the latter supplying the roots of the plants with nitrogen, and in return receiving carbon and other necessary food elements.

Symbolism, the sign or representation of any moral or spiritual thing

by the images or properties of natural or material things; or the assumption in external things of an inner spiritual meaning, *e.g.* the lion is the symbol of courage, the lamb of meekness or patience. Symbols themselves are of various kinds, as types, enigmas, parables, fables, allegories, emblems, hieroglyphics, etc. Some closely approximate to or rather are readily suggestive of the inward significance with which they are invested, or the event of which they are the representation, while others, like the material objects of idolatry, are often either in no way apparently related to such significance or representation, or such connection as there may be is to be sought in some long forgotten association of ideas, *e.g.* the tree-trunk which assists a savage to meditate on some divine conception merely because thousands of his ancestors having so regarded such symbol it has become sanctified with a halo of reverence. S. is also specifically applied to the system which invests the forms of Christian ritual, dogma, and the fabric and architecture of the churches with a symbolical meaning. Thus in the eucharist the bread and wine are called *symbols* of the body and blood of Christ. In connection with the subject of baptismal S. it is a highly controversial question whether any worshipper, however spiritually minded, can dispense altogether with symbols or material facts, either as an aid to the realisation and expression of spiritual truths, or as an external stimulus to the mental attitude of devotion. Sir Oliver Lodge as an apologist of orthodoxy maintains that, whether the spiritual and material can in fact be entirely separated or not, such separation is never really accomplished, and that some material agent is active even in the most refined and spiritual perceptions. In theology generally every sacrament is an outward and visible sign of inward and visible grace. The Roman Catholic church recognises seven sacraments: baptism, confirmation, the eucharist, penance, holy orders, matrimony, and extreme unction; the Protestant church only two: baptism and communion. Whether these sacraments are regarded by the orthodox in each church as symbolical, or a mere means of grace, is disputable. Sir Oliver Lodge thinks that the general theological conception of a sacrament is recognised by both the English and the Roman church, and cites the Homilies in support (*Man and the Universe*).

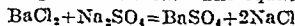
Symbolist, l'Ecole, a reactionary school which arose against the Par-

nassiens (*q.v.*). Its main object was the reproduction of forms and colours by the logical transcription of the idea. According to its originators poetry should translate the deepest secrets of the soul by means of symbols connecting the physical with the moral world. The originator was Alfred de Vigny, and its principal exponents, Bandelaire, Mallarme, and Verlaine, and among the more recent Laforgue, Kahn, Verhaeren, Viéle, Griffin. As an offshoot Moréas founded the Roman school.

Symbols, a symbol is a conventional or arbitrary sign, by means of which the writing of names in science is much simplified.

Chemical.—Dalton was the first to introduce a system of chemical symbols. He represented the *atoms* of substances by means of circles, an atom of one substance being distinguished from that of another by some mark inside this circle. Thus a clear circle \bigcirc represented an atom of oxygen, \odot an atom of hydrogen, \bullet one of carbon, \oplus an atom of sulphur, and so on. He thought that water was the combination of one atom of oxygen with one of hydrogen, he therefore represented a molecule of water by $\odot\bigcirc$. His symbols were entirely superseded by those introduced by Berzelius. The symbol for an atom of an element is usually represented by the first letter of the name of the substance. Thus, carbon C, hydrogen H, oxygen O, etc. In some cases, where the names of several elements have the same initial letter, two letters are employed, thus chlorine Cl, copper Cu, cobalt Co. In some few cases the initial letter or letters of the Latin name is used, thus gold (aurum) Au, silver (argentum) Ag, and so on. It is known that two atoms of hydrogen combine with one of oxygen to form water. Thus H_2O represents a molecule of water and conveys the above idea. In a similar manner a molecule of hydrogen is written H_2 , because it is known to contain two atoms. NH_3 stands for a molecule of ammonia, and implies that three atoms of hydrogen and one of nitrogen are combined. The symbols H, N, etc., stand also for the atomic weight in grams (*q.v.*) of the elements. Thus H, represents two grams of hydrogen, and NH_3 conveys the idea that fourteen grams of nitrogen are combined with three grams of hydrogen to form seventeen grams of ammonia. A similar symbol can be found for all compounds. If the symbols represent gases then we have also a volume relation, because the molecular weight in grams of a gas occupies 22.4 litres. Thus, H_2 , N_2 , NH_3 , etc.

represent 22.24 litres of nitrogen, hydrogen, and ammonia respectively. Symbols are also employed to express chemical reactions, by means of equations. The symbols of the interacting substances are placed, with a plus sign in between, on the left hand side of the equation. On the right hand side are placed the symbols of the substances formed also with a plus sign in between. The equation



means that a molecule of barium chloride (BaCl_2) combines with a molecule of sodium sulphate (Na_2SO_4) to give one molecule of barium sulphate (BaSO_4) and two molecules of sodium chloride (NaCl). Or that 208 grams of barium chloride interact with 142 grams of sodium sulphate to give 233 grams of barium sulphate and 117 grams of sodium chloride. If the interacting substances are gases, we have a relation between the volumes employed in addition to the gravitational relation above. Thus, $\text{H}_2 + \text{Cl}_2 = 2\text{HCl}$ means that one volume (22.4 litres) of hydrogen combines with one volume of chlorine to give two volumes (44.8 litres) of hydrochloric acid gas. In a similar manner interactions between gases and solids or liquids can be expressed either gravitationally or volumetrically, or as a combination of the two.

Arithmetical. + (plus) means addition, positive; - (minus) subtraction; +ve, positive; -ve, negative; + and - stand for positive in magnetism, electricity, or when referring to a direction; =, equality; three strokes (\equiv) means identically equal; \times , multiplied by; \div , divided by;

divided by is also expressed thus, $\frac{a}{b}$, a/b , i.e. a divided by b ; $\sqrt{\quad}$, square root; $\sqrt[3]{\quad}$, cube root; $\sqrt[n]{\quad}$, n^{th} root, and so on; a^n means a multiplied by itself n times; $a^{\frac{1}{n}}$ means the n^{th} root of a .

$a^{-n} = \frac{1}{a^n}$, $a^0 = 1$; \therefore = therefore; \because = because. The expression $a : b :: c : d$ means that a is to b as c is to d , or $\frac{a}{b} = \frac{c}{d}$; \propto , varies as, e.g. $y \propto x$, y varies as x ; $>$ greater than; $>$ not greater than; $<$ less than; $<$ not less than, e.g. $a > b$, a is greater than b ; $-$ the difference of, e.g. $x - y$, difference of x and y ; $x \sim y$, x is similar to y ; \approx , equal and similar; \square square; \square cms., square centimetres, also written sq. cms.; c.c., cubic centimetres; cm., centimetres; mm., millimetres; gm. grams. £ s. d., pounds, shillings, and pence. Feet and inches are written and " ; thus $5' 6" \times 4' 3"$

means 5 feet 6 inches by 4 feet 3 inches; ∞ , infinity, a quantity greater than any we can name. 0 zero. $n!$ or $n!!$ (factorial n) means $n(n-1)(n-2) \dots 1$. nC_r , combinations of n things r at a time; nP_r , permutations of n things r at a time; $\{ \} ()$

—, brackets; Σ , the algebraic sum of; a, b, c , etc., usually denote constants, and x, y, z , variables.

Geometrical. \square , square; \square^* , square inches; \square' , square feet; Length is denoted usually by L or l , area by A or a , volume by V or v , radius by R or r , diameter by D or d , radius of curvature by ρ , angle ABC by \widehat{ABC} or $\angle ABC$; rt , right angles; rt or \perp at right angles or perpendicular

to; \parallel parallel; $\not\parallel$ not parallel; \square

rectangle; \bigcirc , circle; $\langle \rangle$ parabola;

$\bigcirc \cdot \bigcirc$ ellipse; \times hyper-

bola; R.H., rectangular hyperbola; \parallel^m , or \square^m , parallelogram; \parallel^p , parallel piped.

Calculus. $f(x)$, $F(x)$, $\phi(x)$, $\psi(x)$, etc., functions of x ; $f(x, y)$, $F(x, y)$, etc., functions of x and y ; $f^{-1}(x)$, $F^{-1}(x)$, etc., inverse functions of x and y ; D , differentiation; $\frac{d}{dx}$ differentiation with respect to x . Thus $\frac{dy}{dx}$, differentiation of y with respect to x ; $\frac{d^2y}{dx^2}$, y differentiated n times with respect to x ; δ , increment, thus δx is the increment of x ; $\frac{\partial}{\partial x}$, partial differentiation; \int or D^{-1} integrate. In Newton's fluxional notation \dot{x} means differentiate x with respect to time; \ddot{x} differentiate twice, and so on.

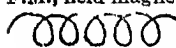
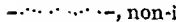
Trigonometrical. $P(x, y)$, the co-ordinates of point P are x and y . Sin, cos, tan, etc., are abbreviations of the circular functions sine, cosine, tangent, etc. $50^\circ 10' 24''$ means an angle 50 degrees 10 minutes 24 seconds (see TRIGONOMETRY). ≈ 3.14159 , approximate ratio of circumference of a \bigcirc to its diameter; \sin^{-1} , \cos^{-1} , inverse of sine, cosine, thus if $\theta = \sin^{-1} x$, $\sin \theta = x$. The sides of a triangle ABC , are usually denoted by a, b, c , a being opposite A , and so on. An angle is often denoted by $\theta, \phi, \psi, \alpha, \beta$, etc. Log., logarithm; e , the base of the napierian or hyperbolic logarithms.

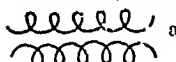
Mechanical. C.G.S., centimetre-gramme-second system; F.P.S. or

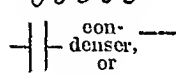
ft. lbs. sec., foot-pound-second system; g , value of gravitational acceleration; M , m , mass; V , v , velocity; a , f , acceleration. V , volume; A , area; W , weight; w , weight of unit mass. K.E. or T, kinetic energy; V , potential energy; ft. lbs., foot-pounds in work; lbs. feet, pound-feet in momentum; T , t , time; F , force; T , tension; p , pressure; ω , angular velocity; ρ , volume density; σ surface density; λ , line density; E , Young's modulus; N , rigidity modulus; n , number of; I , moment of inertia; $T.M.$, twisting moment; B.M., bending moment; Q , quantity; H.P., horse-power.


Physical. t° , temperature in degrees; J , Joules' equivalent; F° , C° , degrees Fahrenheit and centigrade respectively.

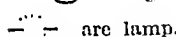
Electrical. x , y , z , etc., current. C , continuous current in amperes; C_e , C_a , external and armature current; R , resistance in ohms; R_a , R_s , resistance of armature and shunt; ρ , specific resistance; E.M.F., electromotive force, or simply E , also in volts; I , maximum alternating current; i , effective alternating current. L , M , coefficients of self and mutual inductions; Z , impedance; ω , ohm; Ω , megohm; K , k , capacity or specific inductive capacity; mfd , microfarad; Q , q , quantity of electricity; z , electrochemical equivalent. ll , cell; lll , battery of three cells in series. F.M., field magnet.

 inductive resistance;
 non-inductive resistance;

 alternating current transformer;

 condenser, or

 glow lamp;

 arc lamp.

Pw , power in watts; WJ , work in Joules; G , galvanometer; s , shunt; A , ammeter; V , voltmeter; n , number of turns of wire; \sim , alternations per second; B.T.U., Board of Trade units; B.Th.U., British thermal units.

Magnetic. N , S , north and south poles of a magnet; m , strength of pole; l , distance between poles; M , magnetic moment; H , strength of magnetic field; I , intensity of magnetisation; B , magnetic induction; K , magnetic susceptibility; μ , magnetic permeability. M.M.F., magnetomotive force.

Syme, James (1799-1870), a Scottish surgeon, was a contentious

spirit, who nevertheless impressed his contemporaries with the driving force of his will and with his exceptional abilities as a teacher. For four years (1829-33) he supervised a hospital of his own in Edinburgh, connected with which was a clinical school, and in 1833 he accepted the chair of clinical surgery in the university of that town. He wrote *Principles of Surgery*, 1832, etc.

Symington, William (1763-1831), a Scottish inventor, has every title to the claim of having made the first practical steamboat, for the *Charlotte Dundas* was already working on the Forth and Clyde Canal in 1802. The paddle-wheel was propelled by Watt's rotative engine.

Symmachus, Quintus Aurelius (c. 345-410 A.D.), a Roman statesman, cherished, like Cicero, a deep veneration for the past. The letter which, as prefect of the city (384), he addressed to Valentinian II., urging him to restore the altar of Victory, is still extant.

Symmachus the Samaritan (fl. 200 A.D.) was a native of Samaria, who became an Ebronite Jew. He published a Greek translation of the O.T.—the third in point of time—which now only exists in fragments.

Symmetry, in mathematics, means in agreement, or in a sense, proportional. Consider the two halves into which a diameter cuts a circle. The two semi-circles are symmetrical, because they are proportional about the diameter and could be fitted one on the other if folded along the diameter. Equations can often be written in symmetrical form, in which form they are most easily dealt with.

Symonds, John Addington (1840-93), an English man of letters, spent his life, like R. L. Stevenson, in combating the demon of ill-health, and like Stevenson again was never happy unless working at a fever heat. He, too, moreover, was obliged to elude the rigours of an English climate, finding a happy refuge in Davos Platz—as he describes so charmingly in *Our Life in the Swiss Highlands* (1891). His critical biographies of Shelley (1878), Sir Philip Sidney (1886), and Michelangelo (1893) are true literature, and his *Autobiography of Benvenuto Cellini* (1887) exhibits his admirable gifts as a translator. Besides poems, S. wrote essays on Dante (1872) and the Greek poets (1873-76).

Symons, Arthur (b. 1865), a poet and critic, born in Wales. In 1889 he published a book of verses, *Days and Nights*, which was favourably reviewed by Walter Pater in the *Pall Mall Gazette*. His next two volumes of

poetry, *Silhouettes* and *London Nights* evinced the influence of Verlaine, with whom he had meanwhile formed a friendship; since then Mr. S. has produced many works, notably *Aubrey Beardsley*, 1897; *The Symbolist Movement in Literature*, 1899; *Cities*, 1903; *Plays, Acting, and Music*, 1903; *Studies in Prose and Verse*, 1904; *Cities*, 1905; *Studies in seven Arts*, 1906; *Cities of Italy*, 1907; and *Knave of Hearts*, 1913.

Symons, George James (1838-1900), a famous meteorologist, founder of the British rainfall organisation, and the first to keep records of the rainfall of Great Britain. In 1856 he entered the Meteorological Society, and in 1857 he was appointed a reporter to the Registrar General, and later worked under Admiral Fitzroy, who was researching on storm warnings on behalf of the meteorological department of the Board of Trade. His first volume, *British Rainfall*, appeared in 1860, and in 1866 he launched out with *Symon's Monthly Meteorological Magazine*.

Symons, Sir William Penn (1843-99), a British major-general, led the Burma column in the Chin-Lushai expedition (1889) and the first division in the Tirah expedition (1893). During the South African War he was mortally wounded during a gallant assault, under his direction, of Talana Hill near Dundee.

Sympathetic Inks, *see* INK.

Sympathetic Nerves, *see* NERVOUS SYSTEM.

Sympathy (from Gk. σύν together, πάθος, feeling), or Fellow-feeling, in a human is an emotional state caused by intense consciousness of the sufferings, feelings, hopes, and pleasures of another living creature. Organic S. is primarily physical and inherited, showing itself in a violent liking for some particular thing (thus, being the opposite of antipathy) or in an innate understanding, as e.g. of wild animals. Reflective S., though originating in primitive emotion caused at the sight or thought of another's condition, is critical and may be developed for the good of society. *See* EMOTIONS, and FEELINGS.

Symphony, a composition, usually of four movements, in sonata-form, for orchestra. The term 'sintonia', originally signified the prelude to an opera, but as a definite and distinct form the instrumental sonata or S. was established by Haydn and perfected by Mozart and Beethoven. The movements are usually (1) an allegro in sonata-form; (2) a slow movement; (3) a scherzo, or with Beethoven, a minuet, and (4) an allegro or presto, in rondo-form, or

occasionally in sonata form. This order is observed in classical Ss., but modern works are often entirely different; in some cases, e.g. Liszt and Elgar, movements follow without a break, as in Beethoven's C-minor (last two movements). The greatest symphonists since Beethoven, including those who use the symphonic-poem form, are Schubert, Brahms, Liszt, Tchaikovsky, R. Strauss, Dvorak, Parry, Stanford, and Elgar. *See* SONATA.

Symphoricarpus, a genus of Caprifoliaceae indigenous to N. America. Of the eight species the best known is *S. racemosus*, the snowberry, frequently cultivated as a shrubbery-plant.

Symposium (Gk. συμπόσιον), a Greek drinking party. The title was used by both Plato and Xenophon for books describing the conversations of Plato, and hence the term has changed its meaning to that of a conference or general discussion.

Symptoms, certain changes in the bodily processes of a patient which serve to indicate the nature and location of a disease. An *accidental symptom* is one which is not connected with the disease.

Synagogue (Gk. συναγωγή, an assembly), a word used to denote either the congregation, or the place itself in which Jewish communities meet together for public worship. The origin of the S. is obscure. From the earliest times, however, some special local assemblies seem to have been needed in addition to the Tabernacle and Temple services. Something of the same kind is indicated in Is. viii. 16. The true development of the S., however, dates from the days of Ezra's reformatations, from which time every Jew was expected to be acquainted with the law. The conduct of the S. was in the hands of ten lay 'rulers.' The chief services were on the Sabbath morning.

Synallaxis, a genus of passeriform birds in the family Dendrocolaptidae, contains several species which have peculiarities in the construction of their nests. Their cry is harsh and the birds are usually found in pairs.

Syncellus, George (d. c. 800), a Greek compiler, was a monk who served Tarasius, patriarch of Constantinople as 'syncellus,' or chaplain. His *Chronography*, which deals with the world's history from Adam to Diocletian, is a plagiarism of Eusebius' *Chronicon*.

Syncline, the trough-like part of a geological fold, the strata sloping inwards towards the centre of the trough. *See* ANTICLINAL.

Syncope (from the Gk. συγκοπή, a cutting short, from κόπτω, I cut), a

grammatical term denoting the elision or non-pronunciation of a letter in the middle of a word, as, for example, of the 'e' in 'heav'n,' and of the 'v' in 'o'er.' See FAINTING for another meaning of the term.

Syncretism (Gk. *συγκρητισμός*, union against a common enemy), in philosophy and theology, the tendency to unite in one the chief points of various different systems having some common basis. The term is specially used to denote a scheme advocated in the 17th century by Calixtus for the reunion of Roman Catholics and the various Protestant bodies.

Syndie (Gk. *σύν*, together, and *δικα*, justice), in ancient Greece, an advocate in a court of justice. In the Roman digest it means an attorney or agent for a *universitas* or corporate body: in which sense Gaius uses it as a synonym for *Advocatus*. In the middle ages Syndicus meant the agent or factor appointed by corporations to manage their common affairs, though more especially to represent them in law courts. On the continent, S. meant a government official invested with different powers in different countries, or a kind of magistrate intrusted with the affairs of a city or community. In Greece the S. was the advocate. Almost all the had their Ss. S. Cambridge University, their chief duty being to regulate fees.

Syndicalism. After Sir Wm. Harcourt's declaration, 'We are all Socialists now,' it became apparent that the terrifying properties of the word 'Socialism' were wearing thin. Hence recourse to a new 'logie-word,' and to-day (1913) the word 'Syndicalism' is used to frighten timid souls. The body of doctrine represented by this word is at present ill-defined, and is hardly indicated by it. The word is derived from the French *Syndicat*. In France, where S. was born, a syndicate does not mean, as in English, a trading company, but an organisation of working men. The best English equivalent of the term is *revolutionary trade-unionism*. S. is somewhat akin to the Industrial Unionist movement in the U.S.A., but is best suited to European continental conditions, and flourishes most in the Romance countries. Georges Sorel, the Marx of this movement, is a Frenchman, and among other prominent exponents of Syndicalist theories are the Italians, Arturo Labriola and Enrico Leone. Let us first examine its constructive side.

All the modern social theorising starts with an examination of the

claims of different candidates to the ownership and control of industry. These are: (1) the present owners, i.e. the private capitalists; (2) the state; and (3) the workers in the industry. The social system representative of the first is Capitalism; of the second, Socialism; of the third, Syndicalism. Joint ownership is possible between any two of these groups, and for the different social theories based on these partnerships the reader is referred to the article SOCIALISM. But S. *sans phrase* stands for the unfettered ownership and control of industry by the workers' trade unions linked in a loose national federation. The mines would belong to the miners, the railways to the railway workers, and so forth, and each union would make its contract with others. Thus the miners' union would arrange to supply the coal necessary to work the railways in return for which the railway union would carry the coal got by the miners. A council of representatives from all the unions would administer national concerns, but for the rest *laissez faire* would be the ruling idea. A central parliament, with representatives from geographical districts as now, does not enter the Syndicalist scheme of things. It will thus be seen

that S. is a sort of group Anarchism and orthodox (or Marxian)

have not hesitated to denounce S. as sheer anarchism. Syndicalist leaders retort that S. is a true child of Marx, and that if the great father of modern Socialism were alive to-day he would denounce as reactionary the present Socialist leaders.

S. made its first initial appearance in Britain towards the end of the first decade of this century, but the general public was first made aware of its existence by the series of widespread strikes in the year 1911. In 1912 a number of prosecutions and convictions of English Syndicalists for attempting to seduce soldiers from obedience to their officers when called upon to fire in cases of riots arising from trade disputes, revealed the anti-militarist nature of Syndicalist propaganda (see HERVE, G.). Messrs. Tom Mann, Guy Bowman, and Gaylord Wilshire are leading English Syndicalists. The first international Syndicalist Conference was held in London in the autumn of 1913.

Mrs. Sydney W. Means books and periodicals. The following may be mentioned here: Dr. Louis Levine, *The Labour Movement in France, a Study in Revolutionary Syndicalism* (Columbia University Series); A. D.

Lewis, *Syndicalism and the General Strike* (Unwin); W. Sombart, *Socialism and the Social Movement* (Dent);

God.
ing to

Synge, John Millington, born at Ptolemais in the Libyan Pentapolis, was a native of Cyrene in Africa. At Alexandria he attended the mathematical and philosophical lectures of the great Hypatia. A convert to Christianity, he was loth to accept his bishopric, and was actually allowed by the compliant Theophilus to keep the wife he dearly loved. His 156 letters are of intense interest, and there is much to divert the scholar in his treatises in *Praise of Baldness*, on *Dreams*, and on *Self-Discipline*.

Synge, John Millington (1871-1909), a dramatist, born at Rathfarnham, co. Galway; educated at Trinity College, Dublin, 1888-92. He studied music in Germany (1893) and literary criticism in Paris (1895), where he



JOHN MILLINGTON SYNGE

was 'discovered' by Yeats (1899) and persuaded to identify himself with the so-called 'Celtic Re-

movement. His writings, in 8 vols.)
Western World,
no of the Glen.

a *Deirdre*, *Tinker's Wedding*, *Riders to the Sea* (plays); *In Wicklow and West Kerry*, *The Aran Islands* (prose); and *Poems and Translations*. See critical lives by F. Bickley and P. P. Howe.

Synonym (Lat. *synonymum*; Gk. *σύν*, together; *ὄνομα*, name), the term applied to a word which has the same or almost the same meaning as another word, or to a pair of words with the same meaning, illustrated by the words 'begin' and 'commence.' There is often, however, a slight difference, which sometimes

Syndicalism and Labour is a general adverse criticism, and Messrs P. Snowden and J. R. MacDonald have written criticisms from the Socialist point of view.

Syndicate, a partnership formed to carry out some one special financial or industrial project or enterprise, as, for example, to purchase the Crystal Palace, to erect a monument, or to float a company. In the absence of express stipulation to the contrary, such a partnership legally continues only up to the termination of the adventure which is the subject of the partnership. Similarly in the case of joint stock companies under the Companies Consolidation Act, 1908, if the main object of a company is gone, the company must be wound up. This may be illustrated by the case of the *Amalgamated Syndicate* (1897); the company was formed to erect stands and let out seats for the *Diamond Jubilee procession*. The memorandum of association contained the usual comprehensive powers, among which were: (1) to carry on all manner of promotion business; and (2) to act as house agents. After the Jubilee, the S. having incurred a heavy loss, the directors proposed to carry on business under the above specified powers, but the court held that the substratum having gone, the company must be wound up; and the enumeration of powers were read by the court not as a succession of objects different from the main object, but as general powers merely providing for the execution by the company of matters which are only incidental to its main objects. In connection with stock companies it need hardly be said that the formation of a S. is a customary mode of setting about flotation of a company; in which sense it is further to be noted that a S. is generally itself an incorporated company, which having acquired a certain undertaking, sells it to another company at a profit, taking either cash or shares or both in exchange, the directors and promoters of the preliminary company or S., as a rule, becoming large shareholders and directors of the new company.

Synergism (Gk. *συνεργία*, co-operation), in theology, the doctrine that in the work of salvation the will of man must co-operate with the will of

becomes greater, so that the terms eventually lose their synonymous force.

Synovial Membrane, a membrane covering the articular extremities of bones and the inner surface of ligaments entering into the formation of a joint. It secretes a clear lubricating fluid with an alkaline reaction. *Synovitis* is inflammation of the synovial membrane; it may lead to ankylosis or stiffening of the joint.

Syntipas. This is the title of a collection of stories, written in Greek, and bearing the name of Michael Andropoulos, but the collection is evidently translated from an Oriental work. Many of the stories of S. are found almost verbatim in an Arabic manuscript of the *Arabian Nights*, in the British Museum, but the whole style of the stories points evidently to an Indian origin.

Syntonin, the acid albumen into which myosin is converted by the action of dilute acids. It is also called 'musculo fibrin,' being akin to fibrin, an important constituent of muscular tissue.

Syphax, a Numidian warrior, was king of the Massylians, but before 204 B.C. had defeated Masinissa and made himself master of the Massylian kingdom. At first a dangerous enemy to the Carthaginians, he finally threw in his fortunes with their leader, Hasdrubal—influenced, it is said, by Hasdrubal's daughter, Sophonisba, whom he married. Eventually he died a Roman captive after Scipio had destroyed his camp and troops by fire near Utica (203 B.C.).

Syphilis, a chronic infectious disease generally contracted during sexual intercourse. It is contagious until the tertiary stage is reached. The origin of this disease is rather uncertain, but we have grounds for believing that it was introduced into Europe by Columbus's sailors who had contracted it at St. Domingo. Other names which it has been known under are the 'Neapolitan disease' and 'the French disease.' At the end of the 15th century it spread through Europe in the form of a great epidemic. It is characterised by various structural lesions, the most distinctive of which are the chancre, the mucous patch, and the gumma. A parasite (*Spirochæta pallida*), present in the lesions, is accepted as the cause. Being generally a sexual matter, the most common situation for its appearance is the genital organs, but it may affect any abraded surface on the body that the germ may come into contact with. An abraded surface, however, is not essential, as the virus can easily penetrate the delicate, soft, and moist mucous surfaces

upon which chancres are commonly found. The earliest manifestations of acquired S. is the chancre or primary sore which appears between two and six weeks after the disease is first contracted. It usually takes the form of a reddish-brown pimple with an ulcerated summit and an indurated base which, when pressed between the finger and thumb, has a cartilaginous feeling. Following the appearance of the chancre the nearest lymphatic glands swell and become hard. The mucous patch is formed upon mucous membranes or in situations where two skin surfaces are constantly in contact. It is a slightly elevated patch usually covered by a thin whitish membrane. The gumma is a rounded tumour of varying size. Its usual situations are the periosteum of flat bones, the membranes of the brain, the testicle, liver, and spleen. It contains a gummy material and is generally soft to the touch.

There are three stages in the course of the disease: (1) the primary (*primary S.*), distinguished by the presence of the chancre; (2) the secondary (*secondary S.*), by the mucous patch, sore throat, and swelling of the glands; and (3) the tertiary (*tertiary S.*), by the gumma and skin lesions. A period of six to nine weeks intervenes between the appearance of primary S. and that of secondary S. No definite time can be fixed for tertiary S., as it is extremely variable. S. other than that acquired through sexual connection is known as *non-venereal* or *S. insontium* (S. of the innocent). Forms of non-venereal S. may be *congenital*, *hereditary*, *æconomica* (i.e. that form contracted by using contaminated materials, e.g. a towel formerly used by an affected person, and also by casual contact with a syphilitic), or *technica* (i.e. that form acquired by those attending on syphilitics, e.g. doctors, nurses, and midwives).

The general idea regarding S. seems to be that it is an incurable disease and usually proving fatal. In this connection Hutchison states: 'It would be absurd to speak of syphilis as in the main a bugbear, but the impression derived from my own experience as to its curability and remote results incline me to suspect that the gross exaggerations prevalent respecting it cause more misery than is produced by the disease itself.' This eminent authority further suggests that the popular estimate of its prevalence is also grossly exaggerated.

As a cure for S. mercury and iodides have been used, but these are likely to be superseded by a marvellous chemical compound discovered by Ehrlich with the assistance of S.

Hata (of Tokio) and at one time known as *Ehrlich-Hata*. This is dioxo-diamino-arseno-benzoldi-hydrochloride, registered as *Salvarsan*, and commonly called '606.' The use of salvarsan has been attended with startling and almost miraculous effects. Ehrlich writes concerning the specific action of '606': 'With a sufficient dose spirochetes disappear in 24 to 48 hours; if longer, it is due to the dose being insufficient or being insufficiently absorbed.'

A royal commission, under the chairmanship of Lord Sydenham has been appointed quite recently (Nov. 1913) to investigate the whole of the subject of the *hidden plague*—as it is called in the terms of reference, which are extremely wide. The appointment of this commission has met with world-wide approval and interest, and Professor Ehrlich himself has offered his services in connection with it. The importance of this subject being thoroughly investigated can be gauged from the fact that at the meetings of the Royal Society of Medicine in 1912 it was stated authoritatively that there were 40,000 cases at least in London only, and 130,000 in the United Kingdom. As has been pointed out, it is absolutely curable, but the grave danger consists in the fact that it is *contagious*, and can therefore—as has been shown in the course of this article—be acquired by perfectly innocent people, such as wives, students, dentists, and children, and may thus even be passed on to the descendants of such people. The difficulty lies, of course, in the fact that the whole subject has been banned from open discussion; because of the manner in which it is mainly acquired, and is always associated with, illegitimate sexual intercourse, persons afflicted endeavour to conceal the fact; hence the name *hidden plague*. It would be easy to paint in glowing colours the terrors resulting from such conduct, but once it is recognised that by placing oneself absolutely under the control and direction of any responsible and well experienced medical man until he discharges the victim as cured, a large number of these terrors will disappear, and in time, it is confidently asserted by some authorities that the plague itself may be exterminated (at any rate, in non-tropical countries). It must be noted, however, that the doctor's instructions must be thoroughly carried out and his word taken as law, otherwise, as can be shown by the following example given in a prominent English monthly periodical, the effects may be disastrous. A young man, it is assumed becomes affected, and after the usual

foolish delay, consults a medical man. Very soon the young man imagines himself cured, fails to visit his adviser, and ceases the course of treatment; although he has been told that the remedy takes at least a year. Naturally in the course of a few months the secondary symptoms appear and again he takes up the course, this time more seriously; but, as before, he again rejects the advice given him. Later, he marries, and again has to see his doctor. This time he has tertiary symptoms. In the meantime a child has been born and in a month or so shows the hereditary taint. The wife, until the child has been born, has shown no signs of contagion; but—and the importance of this cannot be too much insisted upon—she acquires S. from the fetus during parturition (unless, and this is very rare, she has been placed under treatment months before). This is quite sufficient to show the necessity for rigorous treatment of the scourge, for a changed attitude of mind towards it, and for more openness on the part of its victims. It will also show, as has been pointed out by Sir Jonathan Hutchison and powerfully reiterated by Civism, that the danger of the scourge in European countries is not the disease itself, but the *neglect* of the disease.

It must not be assumed, however, that one can act with impunity and transgress the ordinary moral code of to-day as one is led by desire. Although Hutchison has formulated the following law of hereditary transmission, 'It is not the state of health of the individual that is transmissible, but the law of syphilitic transmission is fundamentally from that of such diseases as gout and scrofula,' and although it follows from this that people who have been cured may marry and have perfectly healthy offspring, yet it is still, and always will be, not equally applicable to male and female. For an affected woman retains the germ much longer than a man, and it is extremely difficult to state with an absolute degree of accuracy when, in such cases, a cure has been effected. Candour on this question, and serious and intelligent study, will undoubtedly lessen its danger; and, more important still, may result in the uplifting of the general moral tone of future generations of young people with a consequent growth of cleanliness of mind and body. For fuller information, see Beddoe, *Syphilis*; Bayly, *Clinical Pathology of Syphilis and Parasyphilis*; Browning and Mackenzie, *Recent Methods in the Diagnosis and Treatment of Syphilis*; Dalton, *Veneral Generative Diseases*; Hutchi-

son, *Syphilis*; Lambkin, *Syphilis*; M'Intosh and Fildes, *Syphilis from the Modern Standpoint*; Martindale, *Salvarsan* ('606'); McDonagh, *Salvarsan in Syphilis*; *System of Syphilis* (6 vols.); Ehrlich and Wechsellmann, *Salvarsan*. See also GONORRHEA.

Syra, or Syros (ancient Σύρος), an important island of the Greek Cyclades in the Ægean Sea, having an area of 55 sq. m. Since the loss of its forests it has become noted for its bare and rocky soil. In 1800 the inhabitants numbered some 1000, but after the settlement of Greek refugees the island rapidly became populous. In spite of the competition of Piræus the chief port, Hermupolis, which is the seat of a Roman Catholic bishop as well as of the government, is still a flourishing commercial entrepôt of the Levant, exporting sponges, emery stone, lemons, and valonia. Pop. 31,939.

Syracuse: 1. (It., *Siracusa*), a fortified city and seaport, the cap. of the prov. of Syracuse, Sicily, is situated on the peninsula (formerly an island) of Ortygia, 81 m. S.W. of Messina. It has a cathedral, and other ecclesiastical edifices, the ruins of Greek and Roman temples, catacombs, aqueducts, an amphitheatre, and quarries which were formerly used as prisons. There are also the remains of a Greek theatre and a museum of antiquities. There is trade in salt, wine, chemicals, pottery, olive oil, asphalt, almonds, oranges, and lemons. Pop. 40,589. In ancient times it was the wealthiest and most populous city in Sicily. It was founded in 734 B.C., one year after the foundation of Naxos by a colony of Corinthians and other Dorians, led by Archias the Corinthian. At the time of its greatest prosperity S. had two harbours. The Great Harbour, still called Porto Maggiore, is a splendid bay about 5 m. in circumference, formed by the island of Ortygia and the promontory known as Plemmyrium. The Small Harbour, also called Laecius, lying between Ortygia and Aehradina was capacious enough to receive a large fleet of ships of war. There were several stone quarries (*laurumia*) in S., which are frequently mentioned by ancient writers, and in which the unfortunate Athonian prisoners were confined. The government of S. was originally an aristocracy and afterwards a democracy, until Gelon made himself tyrant or sovereign of Syracuse in 485 B.C. Under his rule and that of his brother Hieron, S. was raised to an unexampled degree of wealth and prosperity. Hieron died in 467 and was succeeded by his brother Thrasybulus; but the rapacity and cruelty of the latter soon

provoked a revolt among his subjects, which led to his deposition and the establishment of a democratical form of government. The next important event in the history of S. was the siege of the city by the Athenians, which ended in the total destruction of the great Athenian armament in 413. The democracy continued to exist in S. until 406, when the elder Dionysius made himself tyrant of the city. After a long and prosperous reign he was succeeded in 367 by his son, the younger Dionysius, who was finally expelled by Timoleon in 343. A republican form of government was again established; but it did not last long, and in 317 S. fell under the sway of Agathoeles. This tyrant died in 289, and the city being distracted by factions, the Syraeans voluntarily conferred the supreme power on Hieron II., with the title of king in 270. Hieron cultivated friendly relations with the Romans; but on his death in 216, at the advanced age of ninety-two, his grandson, Hieronymus, who succeeded him, espoused the cause of the Carthaginians. A Roman army under Marcellus was sent against S., and after a siege of two years, during which Archimedes assisted his fellow-citizens by the construction of various engines of war, the city was taken by Marcellus in 212. From this time S. became a town of the Roman province of Sicily. S. declined under the dominion of the Romans, but owing to its beautiful edifices, and the fact of its being the centre of intellectual culture, it always held a prominent position. In 878 A.D. the Saracens captured the city, and looted it of its treasures, afterwards burning it to the ground. Although rebuilt the city never recovered its former importance. It suffered severely from earthquake in 1170 and 1693. Consult Freeman *History of Sicily*. 2. A city and port of New York State, U.S.A., cap. of Onondaga co., is built on the S. shore of the lake of Onondaga, 147 m. W. of Albany. It is the seat of a university, and is a commercial centre of great importance. The chief manufactures include machine-shop products, soda ash and kindred products, farm tools, furniture, beer, motors, machinery, and woollen goods; minor industries are connected with chemicals, salt, wine, and pottery. Here is a U.S.A. weather bureau attached to the university; it was opened in 1902. It was formerly a great salt producing centre. Pop. (1910) 137,249.

Syr-Daria, a prov. of Russian Turkestan, Asia, lying N. of Bokhara and Samarcand, and bounded W. by the Aral Sea, and E. by E. Turkestan. Area 194,947 sq. m. Pop. 1,858,200.

More than half of its area is desert or stoppe-land, inadequately irrigated. The chief river is the Syr-Daria (Jaxartes or Sihun) which rises in the Tian Shan Range, being known by various names in its upper course. The Amu Daria (or Oxus) flows along part of the S. frontier. The Kizil-Kum and Kara-Kum deserts lie in the E. of the prov., but in the fertile region farther S. wheat, barley, rice, millet, oats, rye, and fruits are raised. Cotton is also grown to a small extent. The minerals found include silver, porphyry, copper, lead, coal, salt, and turquoise. Weaving, saddlery, and metal-working are carried on. The prov. was steadily Russianised between 1845 and 1867. The chief towns are Tashkent, Kokand, and Namangan.

Syria, a country of Turkey-in-Asia, lying between the Levant on the E. and the Arabian Desert and the Euphrates on the W., and extending N. and S. from Mt. Taurus to the S. frontier of Palestine. It was the Aram (or 'the highlands') of the ancients, and in a narrower sense only implied the region N. and N.E. of Palestine. Its surface is mainly plateau, gently dipping from the Libanus and Anti-Libanus ranges (6000-10,000 ft.) towards the Arabian Desert. Area 114,530 sq. m. Pop. 3,675,100, mainly Mohammedans, Druses, and Shi'ites. The chief river is the Jordan, which rises on the W. side of Mt. Hermon and flows S. to the Dead Sea. The chief ports are Beyrout, Acre, Tyre, and Tripoli. The vine is ex-

live oil, lemons tobacco, and cereals are exported. The inhabitants of S. were of Semitic origin, of the same stock as the Hebrews. At the beginning of the Hebrew monarchy S. was divided into a number of petty kingdoms, which were generally at war with Israel. As the great Assyrian kingdom waxed, S. waned, and Damascus was destroyed by Tiglath Pileser, king of Assyria, who conquered all S. about the middle of the 8th century B.C. After having successively been a part of the Assyrian, Babylonian, Persian, and Macedonian empires, S. once more became powerful under the rule of Seleucus Nicator (312 B.C.) with Antioch for its capital. Its strength was further increased by Antiochus the Great; it was then that Palestine became a Syrian province. In 66 B.C. (after the destruction of the kingdom of S. by Tigranes), S. was added by Pompey to the possessions of the republic, and became a Roman province; as such it is mentioned in the N.T. Much later Zenobia, Queen of

Palmyra, endeavoured to make S. the seat of empire. The Roman emperors were sorely put to it to defend S. from Persian incursions. When the Roman empire was divided, S. was included in the Byzantine empire until 636, when it was conquered by the Saracens, who held it during the troublous times of the Crusades. S. later fell into the hands of the Egyptians, was overrun by the Mongol hordes in 1290, and its destruction

Turks, who in 1516, remained a Turkish province. See Baedeker, *Palestine and Syria*. See also PALESTINE, DEAD SEA, JORDAN, LEBANON, PALMYRA, etc.

Syriac Language and Literature.

to the (which branch in the Bible in several places, and passages of Syriac occur here and there. In Dan. ii. 4 'spake to tl in Syriack,'

follows. Another long passage of Syriac occurs in Ezra iv. 7 ff. Passages in Syriac, or in which the language is referred to, are Matt. xxvii. 46; Mark v. 41, vii. 34; 1 Cor. xvi. 22, etc. It was spoken for over one thousand years over a very wide region of Central Asia, and was the language of a large number of peoples. The term Syriac is sometimes used in a narrower sense to designate the dialect of Edessa, but this is not usual. The Syriac alphabet is founded upon the Hebrew, with alterations. The grammar of Syriac is in general fairly simple. The syntax of Syriac resembles in general characteristics that of Hebrew. As regards phonology, Syriac tends to shorten Hebrew long vowels and to substitute dentals for sibilants. It was at one time thought that Syriac was a derivative of Hebrew.

Singirli show about 700 I language has since from H... inscriptions, it has well-marked Syriac characteristics. It seems to have occupied much the same place in business and diplomatic affairs as French to-day. This is shown by such passages as 2 Kings xviii. 26, and by the nature of the inscriptions which have been found in early Syriac. Syriac attained importance as a literary language, however, in the early centuries of the Christian era. One of the earliest translations of the Bible, the Peshitta (simple), was made in Syriac in the 2nd century A.D., and Edessa rose to importance

as a Christian centre. Shortly afterwards, the traditional commentaries on the O.T. (the Targums), were put into writing. The language of the Peshitta and the Targums differs in some important respects, and that of the Biblical passages has differences from both. By the 4th century, Christian writers had adopted Syriac as a literary language. The Syrian Church was split up into four sects—Malkites, Maronites, Nestorians, and Jacobites—all of which had their service-books and psalters. The greatest of the early Syrian fathers was St. Aphrēm (Ephraim) (d. 373). He was a voluminous writer of commentaries, homilies, and poetical treatises of various sorts. In the 5th century begins the vernacular Syriac historical literature. It was about this time that the pure Syriac language began to be corrupted by the importation of Greek loan words, while Hebraisms also began to creep in. Isaac the Great of Antioch flourished in the 5th century. Like Ephraim he wrote a very large number of works, all of a religious tendency, and also like him wrote much verse. St. Simcon Stylites (d. 459) is remembered chiefly on account of Tennyson's poem. Meanwhile, the Syrian Church was torn with internal conflicts, which are reflected in the writings of the 6th and 7th centuries. Jacob of Serugh, Joshua Stylites, Sergius of Ras'ain (fl. 6th century), John of Asia (b. c. 505), and Jacob of Edessa (b. c. 640), the Monophysite, are important names of the great age of Syriac literature (see Wright, *op. cit. infra*). But with the great schism in the 7th century between the Nestorians and the Jacobites, a separation took place, which implied a severance of tradition in the literature which emanated from the two sects. The writings of Denys of Talmahar and Thomas of Maraghah, however, deserve mention here. But the literature had reached its zenith just prior to the split between the sects, and it never regained its former glory. It practically came to an end with the conquest of Aramœa by the Arabs, though an exception must be made in the case of Bar-Hebræus (fl. 13th century), whose life was largely spent in trying to revive the Syriac language. Syriac is still used as a living language, though in a much corrupted form, by small groups of villagers in Mesopotamia. It is used, more or less in its classical form, as an ecclesiastical language by the Nestorian Church, but the priests who use it are often completely ignorant of the meaning of the formulas they utter. See Crichton's *Noldeke's Syriac Grammar*; W. Wright,

A History of Syriac Literature; R. Duval, *La Littérature Syriaque*.

Syringa, a genus of Oleaceæ, contains ten species which grow in Europe and Asia. The best known of these is *S. vulgaris*, the common lilac, often grown in Britain. The name of *S.* is also given to several shrubby plants in the saxifragaceous genus *Philadelphus*.

Syringe (from the Gk. *σύριγξ*, a pipe), a hydraulic instrument used in medicine for injecting liquids into the body and for washing out wounds, etc. Its principle is the same as that of the pump (*q.v.*), and the essential features are a pointed nozzle and a glass, metal, or india-rubber tube attached thereto and fitted with an air-tight piston. The fluid is projected from the nozzle in a jet which is large in an abdominal as compared with a hypodermic *S.*

Syrinx, an Arcadian nymph, beloved of Pan, who seized her when she was changed into a reed and fashioned out of her a pipe, such as the shepherds were over afterwards wont to play.

Syrin, Jörg (fl. 1450), a German woodcarver, is called 'the Elder' to distinguish him from his son, who followed the same profession. The splendid stalls of Ulm Cathedral are his finest work (1469-74), but he also embellished the fountain which stands in the market place of that town.

Syrtis, or Syries, the classical name of two dangerous gulfs, the Syrtis Major and the Syrtis Minor, in the Mediterranean, off the shores of N. Africa.

Syrup (from Arabic *sharab*, drink) is the same word as 'shrub.' It indicates primarily a concentrated liquid of sugar such as
tilled water :
agent, is used

'Golden syrup' is the uncrystallisable fluid, which is a by-product in the refining of crystallised sugar.

Syssitia, The, were the meals which the men and youths in Sparta and in Crete ate together and in public. The meat was doled out in rations, but barley bread and wine and afterwards olives, figs, and cheese could be had in plenty.

Syzygy (from Gk. *συσυγία*, a yoking together), an astronomical term, denoting either of the two positions of the moon when it appears to be in a line with the sun.

Syzran, a tn., on the r. b. of the Volga, in the gov. of and 89 m. S. of Simbirsk, in Central Russia. It is noted for its tanneries, leather goods, and flour mills, and also as the centre of a market-gardening district. Pop. 45,754

Szabadka (Ger. *Maria-Theresiopel*),

a tn., 108 m. S.S.E. of Budapest, in Bács-Bodrog, Hungary, on the fertile plain between the Danube and the Theiss. It commands a prosperous trade in cereals, cattle, wool, skins, and fruit. Pop. 94,610.

Szalay, Lediſlas (1813-64), a Hungarian historian, born at Budapest, studied philosophy at the University of Peth. About 1837 he began his attempt to popularise modern ideas of social reform in his own journal, *Themis*. He was the representative of the Hungarian government at Frankfurt in 1848. Thence he was sent to London. His best-known work is his *History of Hungary*, 1850-53.

Szarvas, a horse-breeding centre on the Körös, 40 m. E. of Keoskomet, in Békés, Hungary. Pop. 26,000.

Szatmar-Nemethy, a cathedral city, with commerce in potteries, linen, and wine, on the Szamos, 68 m. by rail E.N.E. of Debrecozen, in Hungary. Pop. 28,000.

Sze-ch'uen, or Szechwan ('four rivers'), the largest province (218,480 sq. m. in area) of China, lying in the W. The highlands in the W. rise to 19,000 ft. and the N. is also mountainous, but over the E. and centre stretches a broad and fertile plateau, where cereals, sugar, tea, rice, oranges, rhubarb, and tobacco grow in plenty. The province is well watered by the Yang-tse-kiang in the S. and elsewhere by its large tributaries, the Fu-sung-ho, Min-kiang, and Kialing-kiang, which all

rise in the N.W. There is considerable commerce in salt, timber, copper, coal, and white wax, which an insect secretes. Ch'eng-tu is the capital, but the chief treaty port is Chung-K'ing (598,000 inhabitants), from which silk—the first product of the province—and after that tobacco, medicinal plants, musk, wax, etc., are exported. During 1911 the revolutionary unrest broke out in the form of riots in Szechwan. Pop. 68,724,890.

Szegedin, a manufacturing city of Hungary, cap. of the comitat of Csongrad, is situated at the junction of the Theiss with the Maros, about 100 m. S.E. of Budapest. It is an extremely well-built town, with many handsome and substantial edifices, having been entirely rebuilt since 1879, when the city was swept away by a disastrous inundation, which involved the loss of over 2000 lives. Pop. 118,328.

Szentes, a tn. of Hungary, in the comitat of Csongrad, stands on a trib. of the Theiss, 31 m. N.E. of Szegedin. Pop. 31,593.

Szigetvar, a tn. in the co. of Somogy, Hungary, 17 m. S.S.W. of Mozsgo by rail. In 1566 Count Zrinyi heroically defended its stronghold against the Turks. Pop. less than 6000.

Szolnok, a tn. on the Theiss, 66 m. by rail E.S.E. of Budapest, Hungary. A centre of the woollen and linen thread industries; it trades also in timber and tobacco. Pop. 26,000.

T, the twentieth letter of the alphabet, is a voiceless dental explosive. The earliest form of the letter was X, and the Phœnician name for it was *tau*, which means 'cross' or 'sign.' In early Greek MSS. we find it written ῥ, which came to be written T, its final form. According to the 'first sound shift,' which took place in the Primitive Germanic period, mediæ became tenuis, tenuis aspirates, and aspirates mediæ. (These changes were formulated into a definite law by Grimm in 1822). See GRIMM'S LAW.

Taafé, Count Eduard Franz Joseph von (1833-95), an Austrian statesman of Irish descent, born at Vionna. From 1863 till 1867 he was governor of Salzburg; in the latter year he entered the Austrian cabinet as minister of the interior. He was premier from Oct. 1869 to Jan. 1870, when he was again minister of the interior for a time. After being governor of the Tyrol, he became premier in 1879, and retained the office until his resignation in 1893. T. had great charm of manner and tact, and these served him in good stead in uniting the various nationalities of the empire.

Taal, a pueblo and seaport, Batangas prov., Luzon, Philippine Is., 50 m. S. of Manila. Pop. 18,000.

Taal, the name given to the patois spoken by Dutch settlers in South Africa. It is a degenerate form of Dutch. Dutch is now being taught in the government schools.

Tabaco, a pueblo in Albay prov., Luzon, Philippine Is., on the Gulf of Tabaca, 15 m. N. of Albay. Pop. 22,000.

Tabarca, or Thabargah, a tn., on a fine bay, Tunis, N. Africa, 55 m. E. of Bona, has sardine fisheries. Pop. 2000. Tabarca Island faces the town.

Tabard (Fr. *tabarre*, from Low Lat. *tabardum*), a military garment in general use in the latter half of the 15th century, which fitted closely to the body, was open at the sides, had wide sleeves or flaps reaching to the elbow, and displayed the armorial ensigns of the wearer on the back and front. About the middle of the 16th century the T. ceased to be used except by the officers of arms, who still continue to wear Ts. ombroldered with the arms of the sovereignty.

Tabarl Abū Ja'far Mohammed ibn Jarir at Tabarī (838-923), an Arabian

theologian and historian, born at Amol, who after a series of wide travels, finally settled as teacher of the law at Bagdad. He is famous as the author of the *Annals* (*Tarikh ur Rusul wal Mulūk*), the first Arabic history of the world. He is also the compiler of the most famous commentary on Alkoran.

Tabariyeh (ancient *Tiberias*), a tn. of Palestine, on the lake of Gennesaret or Tiberias, 27 m. E.S.E. of Acre, was the Roman cap. of Galilee, and the scene of a defeat of Crusaders by Saladin (1187). Near the town are hot springs.

Tabasco, a southern stato of Mexico, bounded on the N. by the Gulf of Mexico, on the E. by Campeachy and Guatemala, on the S. by Chiapas, and on the W. by Vera Cruz. The surface is flat and the soil fertile, yielding cacao, sugar, coffee, tobacco, rice, and fruit. The chief towns are San Juan Bautista (cap.) and Frontera (port). Area 10,075 sq. m. Pop. 183,708.

Tabasheer, or Tabashir, a yellowish white deposit of silica in the joints of some of the bamboos, used in the E. Indies as a tonic.

Tabernacle, The, a portable tent-like structure set up by the Israelites in the wilderness for the worship of Yahweh and carried with them in their journeys. Various terms are used for this tabernacle, and it is important to distinguish between the various descriptions of it given in the separate strata of the Hexateuch. Exodus xxxiii. 7-11 gives the earliest reference (E), and this passage compares in a striking manner with the elaborate description given by P (Exodus xxv., etc.). See article in *Temple Dictionary of the Bible*, 1910.

Tabernaemontana, a genus of shrubs and trees (order Apocynaceae), some of which are grown in the stove-house. *T. utilis*, the Hya-hya of Demerara, yields a thick sweet milk-like fluid.

Tabernas, a com. in the prov. and 15 m. N.E. of Almeria, Spain. Pop. 8000.

Tabernas de Valldigna, a com. of Spain, 22 m. S. by E. of Valencia. Pop. 8000.

Tabes Dorsalis, see LOCOMOTOR ATAXIA.

Tabes Mesenterica, a tuberculous disease of the mesenteric glands, lymphatic glands of the mesentery, a

fold of the peritoneum connecting the intestine with the posterior abdominal wall. The disease usually occurs in children, and is characterised by progressive wasting, while the abdomen may become much enlarged through the glands being filled with masses of caseous tubercular matter. Surgical treatment and attention to hygienic conditions may result in a cure.

Tablat, *see* ST. GALL.

Tablatures, systems of notation used during the 15th to 16th centuries for instrumental music. No staff, as used in vocal music, was employed; but the letter-names of tones were ranged horizontally and divided by vertical lines into bars, after the style of Tonic Sol-fa, the signs of duration being written above. Both lute T. and organ T. were used, the latter for all keyboard music.

Tableaux Vivants (living pictures), are representations by living people of scenes from fiction, mythology, history, etc., often with appropriate background, accessories, costume, etc.

Table Bay, an inlet of the Atlantic in the S.W. coast of the Cape of Good Hope, affords a safe anchorage for the largest ships.

Table-land, *see* PLATEAU.

Table-Mountain, or Tafelberg (3540 ft.), a mountain of the Cape of Good Hope, overlooking Capetown and Table Bay. The level top gives it the appearance of a table, and it is often covered with a dense white cloud called The Tablecloth.

Tablet, The, the leading English Roman Catholic Journal, was founded by Frederick Lucas in 1840. Mr. John Snead Cox is the present editor (1913).

Tabley, Baron de, *see* DE TABLEY.

Taboo, Tabu, or Tapu, as it is most rightly spelt, is a native land-custom whereby certain persons and things are cut off from tribal use and intercourse, sometimes as an honour, sometimes as a disgrace, and sometimes for utilitarian purposes. It is prevalent among the Maoris. A chief being tapu, his person, goods, and any article of his are sacred from the touch of his inferiors. Any one who touches a dead body is tapu, as were those who hoed potato fields during the hoeing time. So many places and people were tapu, by a series of complicated rules, that the Maoris themselves could not always remember. A great deal of the trouble that the early settlers experienced was caused by their unconscious violation of the tapu. Thus the Boyd massacre in 1809, when 66 out of 70 whites were treacherously killed, was due to a member of a trading ship's crew, who happened to be a young chief, being flogged. Similarly the

chief who saved the other four was slain with most of his clan, for his violation of the tapu. This tapu system was fairly widespread, for it is common knowledge that the Jews had a rigid system whereby certain things were tapu, as can be ascertained from a perusal of the pentateuch. *See* J. G. Frazer, *The Golden Bough*.

Tabor: 1. A tn. of Bohemia, on the Luschnitz, 65 m. S. of Prague. It was founded by and long formed a stronghold of the Hussites (*q.v.*). There are manufactures of buttons, beer, and cigars. Pop. 11,926. 2. (Arabic *Jebel-el-Tor*), a mountain in Galilee (1843 ft.), 7 m. E. of Nazareth. It is the traditional scene of the Transfiguration.

Tabor (Arabic *lambūr*), a small drum played with one stick, usually in combination with a 'gaboulet' or fife, and often by the same player.

Tabora, a tn. in the centre of Unyamwezi, German East Africa, 210 m. E. of Ujiji (Lako Tanganyika). It is a centre of the ivory trade. Pop. 35,000.

Taborites, *see* HUSSITES, WAR OF.

Tabriz, a city of Persia, cap. of Azerbaijan prov., stands on a small river running into Lako Urumlah, 320 m. W.N.W. of Teheran. An ancient city, with an extensive trade, it was nearly destroyed by an earthquake in 1721. Pop. 200,000.

Tacahout, one of the many sources of gallic acid (*q.v.*).

Tacamahaca, a resinous exudation which occurs on the buds of various species of poplar and is used as a constituent of healing ointments. The name is also applied to the resins obtained from plants of the genus *Calophyllum*.

Tacca, a genus of perennial plants (order Taccaceae) with tuberous roots which are rich in starch. A fecula is extracted from some of the species, notably *T. pinnatifida*, and exported from the Malay Peninsula as a substitute for arrowroot. Some species are grown in the stovehouse.

Tacheometry, *see* SURVEYING AND LEVELLING.
Ta-chien-lu, or Ta-t sien-lu, a tn. of China, in the prov. of Szechuen, 120 m. W.S.W. of Chingtu-fu.
Tachira, a state of Venezuela, on the W. frontier, and bounded on the N. by Zulia and on the E. by Mérida. The cap. is San Cristobal.

Sugar, rice, vanilla, coffee, cacao, etc., are the chief articles of produce, and there are silver, copper, and coal mines. Pop. 78,000.

Tachometer, an instrument for measuring directly the angular velocity of a rotating shaft. It registers the number of revolutions per minute. It resembles a Watt's governor, but is fixed with its spindle horizontal and driven by the revolving shaft. In small instruments, the spindle is pointed and is pressed firmly into the end of the shaft. In the larger instruments a belt and pulley arrangement is employed. Owing to the rotation, the weights have a tendency to fly off tangentially, this tendency being resisted by a spring which thus actuates a needle which moves round a dial indicating the revolutions per minute. In the larger instruments where more exact results are required, a speed counter is employed, the revolutions being counted in this case by the action of a train of wheels.

Tachylite, the term used to cover the glassy representatives of basalts and pyroxeno andesites. It occurs as a thin crust on some lava flows and

Historia (1891); Davis, *Agricola* (1892); Peterson, *Dialogus* (1893); and the Everyman's Library edition. 2. *Marcus Claudius Tacitus* (275-276 A.D.). He became emperor at Rome in September after the murder of Aurelian. His short reign (he died in April) was notable both for improvements at home and victories abroad.

Tack, in Scots law, the technical name for (1) a lease whether of land or edifices; (2) any contract under which something is let for hire.

Tack, a rope, wire, etc., which is used to secure the windward clews or corners of the courses to the ship's side, and the windward lower end of a fore-and-aft sail amidships. Also, in all triangular sails and in those four-sided sails where the head is not parallel to the foot, the foremost corner at the foot is called a T. A ship is said to *tack* when the T's are shifted and the yards braced, and the ship's head turned to the wind, so that she shall sail at the same angle to the wind on the other side; thus by alternate T's a ship proceeds against the wind in an oblique direction, or 'beats to windward.'

Tacloban, a seaport and the cap. of the island of Leyte, Philippines, situated on the N.E. coast on San Juanico Strait. It has a trade with Manila, and exports rice, etc. Pop. 12,000.

Tacna, or San Pedro de Tacna, a prov., dept., and tn. of Chile. The prov. has an area of 9248 sq. m. The tn. is situated on the R. Tacna, 40 m. N. of Arica by rail, which is its port. T. was ceded to Chile by Peru in 1884, the cession being for ten years; it is still occupied by Chile, but in 1913 an agreement between Chile and Peru was accepted and treaties signed. Pop. of prov. 42,900, of tn. 14,500.

Tacoma (called 'the City of Destiny'), a city and seaport of Washington, U.S.A., and the cap. of Pierce co., at the head of Puget Sound. It has an excellent harbour, and it is one of the principal ports on the Pacific coast. There is an important export trade, lumber, flour, and fish are the chief articles. T. was adopted as the chief western terminus of the North Pacific Railway in 1880, when the population was under 1000; in 1910 it was 83,743.

Tacoma Mount, see RAINIER.

Taconic Mountains, a range of hills in Vermont, U.S.A., which contains strata of Cambrian age (with Olenellus Thompsoni, etc.) which have been more or less metamorphosed during Silurian time.

Tacquet, Andreas (1612-60), a Jesuit mathematician, born at Antwerp. He became professor of mathematics (1645) in that city, and

Publius or Gaius Cornelius T. He was born either at Rome or Terni, of a respectable family; studied rhetoric and became an eminent pleader. In 78 he married the daughter of Agricola, governor of Britain. He was quaestor in 79 and praetor in 88, and in 89 went to Germany, where he remained, probably as a governor, till 93. In 97 he became consul under Nerva, after having been a senator during the reign of terror of Domitian. He was the colleague of the younger Pliny in the prosecution of Marius Priscus in 99, after which little is known of his life. Only a part of his works are extant. These include

1. *De rebus Gestis Germaniae* (76 or 77), a history of the empire from Galba to Domitian, in twelve books, of which only four and a half remain; *Annales* (115-117), a history of the empire from Augustus to Nero. His style is peculiarly forceful, condensed, and epigrammatic. Among the editions of his works are those by Orelli (1846); and in English, Furneaux, *Annales* (1895) and *Germania* (1894); Spooner,

published many scientific treatises, the chief being: *Elementa Geometriæ planæ ac solidæ*, 1655; *Arithmetica Theoria*, 1655; and *Geometriæ Practicæ libri tres*, 1659.

Tacsonia, a genus of climbing plants (order Passifloraceæ), with deeply lobed leaves and an elongated tubular calyx, a feature which distinguishes them from the genus *Passiflora*.

Tactics, see STRATEGY AND TACTICS.

Tacuarembó, the largest dept. of Uruguay, crossed by 32° S. and 56° W. The cap. is Fructuoso. Area 8074 sq. m. Pop. 48,933.

Tacubaya, a tn. of Mexico in the state and 25 m. S.S.W. of Mexico. It is the seat of the national observatory. Pop. 20,000.

Tadcaster (Rom. *Calcaria*), a market tn. of the W. Riding of Yorkshire, England, on the R. Wharfe, 9 m. W.S.W. of York. Pop. (1911) 3399.

Tadema, see ALMA-TADEMA.

Tadmor, see PALMYRA.

Tadoussac, see SAGUENAY.

Tadpole, see FROG.

Tael, a unit of weight used in China, Philippines, Straits Settlements, etc., equal to one Chinese ounce, i.e., 1.33 oz. avoirdupois. The weight

1.35
T. is

also a money of account, divided into ten mace, the value varies with locality and the fluctuations of bullion, etc. A customs (haekwan) T. is a T. weight in pure silver, equal to 1600 or 1700 copper cash. The value of this varies considerably from 2s. 6d. upwards.

Tænia, see TAPEWORMS.

Tae-Pings, the name given to the Chinese rebels who made their appearance in 1850, and (see CHINA) desolated some of the best cultivated provinces of China. Peking was taken by the English and French on Oct. 12, 1860. Its capture was followed by the ratification of the Treaty of Tientsin, which, granting important privileges to European merchants, made it the direct interest of the English, French, and American governments to re-establish order in China. The repulse of the rebels at Shanghai in Aug. 1860, had been followed by several engagements between them and the imperialists, in which they were defeated. Ward, an American, who had taken service under the emperor, had wrought a wonderful improvement in the Imperialist army, and was the chief means of their success. In the beginning of 1862, the T. again advanced on Shanghai, and were twice defeated. In the autumn of the same year Ward was killed. Some time previously, Eng-

lish officers were permitted to take service under the Emperor of China, and 'Ward's force,' handed over to an English officer, took the name of Gordon's brigade. The rebels were defeated in upwards of sixteen engagements; and in 1864 almost every important city was taken from them. The conduct of the imperial authorities at Su-chow, where a horrible massacre took place, led to the withdrawal of the English military force; but the rebellion had been effectually checked. Towards the end of 1864, the T., however, still offered an opposition to the Imperialists in Kiang-tsu, all the more formidable in consequence of the prevalence of brigandage and insurrectionary movements in parts of the empire not affected by the T. rebellion. The last embers of the T. rebellion were trodden out in Feb. 1866, when from 30,000 to 50,000 rebels were routed by the Imperial army at Kia-ying-chou in Kwan-tung. See A. Wilson, *Gordon's Chinese Campaign*, 1868; A. E. Hake, *Events of the Tai-ping Rebellion*, 1892.

Tafalla, a tn. of Spain in the prov. of Navarre, on the Cidacos, in a wheat, olive, and wine district. There are old towered walls and a citadel. Pop. 6500.

Taff: 1. A riv. of Wales in Brecknockshire, which rises in Brecknock Beacon and flows S.E. to the Bristol Channel, through Glamorganshire. Its valley is entirely occupied with coal and iron industries. Length 40 m. 2. A riv. of Pembrokeshire, Wales, which rises on the E. side of Presaley Mts., in the parish of Llanfyrnoch, and flows S. through Carmarthenshire to Carmarthen Bay. Length 25 m.

Taffeta, or Taffety (Persian *tâfta*), a term formerly applied to plain woven silks, which were introduced into England about the 14th century. It is now used of mixtures of silk and wool.

Taffi, Andrea (1213-94), an Italian artist, born in Florence. He was the first who introduced among his countrymen the art of painting in mosaic, which he had learnt from Apollonius in Venice. T.'s chief performance was a 'Dead Christ' in a chapel at Florence.

Tafilet, or Tafillet, an oasis on the S.E. of the Atlas Mts., Morocco, noted for its dates. It is a caravan centre, and has been a place of exile for political offenders. Pop. 100,000.

Taft, William Howard (b. 1857), twenty-seventh president of the United States, born at Cincinnati, Ohio. He was the son of the well-known diplomatist and cabinet minister, Alphonso T. He graduated

at Yale University and distinguished himself both as a scholar and an athlete, and was admitted to Ohio bar in 1880. Two years later he was appointed collector of internal revenue, but only held the post a year, and from 1885-87 he acted as assistant county solicitor for co. Hamilton. He was made judge of the Superior Court for Ohio in 1887, solicitor-general of the United States in 1890, and United States circuit judge in 1892. He first made his mark in the political world as the president of the Philippine Commission (1900-4), being made civil governor of the islands in 1901, a position which he held for three years, when he was appointed secretary for War. He visited the islands again in 1905 as a special commissioner, and also visited China and Japan. When the Cuban rebellion broke out (1906), he was sent there and established a provisional government. He also paid another visit to Japan and to the Philippine Is. in 1907. He held office as Secretary of War until 1908, when he was nominated as Republican candidate for the presidency. He was elected as Mr. Roosevelt's successor and inaugurated March 4, 1909. He was president for four years, being succeeded by Woodrow Wilson, who was inaugurated on March 4, 1913. Mr. T.'s presidency was noted for the legislation with regard to tariff reform in what is known as the Payne Aldrich Act, and which led to a split in the Republican party; his efforts to deal with the trust question, the troubles relating to conservation, and the labour and Socialist troubles. His presidency throughout was marked by a keen desire for reform; but in 1912 a serious split in the Republican party led to the formation of a New National Progressive party with Mr. Roosevelt at its head, and it was that which eventually defeated Mr. T. at the election in 1912.

Taganrog, a tn. and seaport of Russia in the gov. of Ekaterinoslav. It is situated on a bay of the Sea of Azov, and its industries include fishing, tanning, leather, tobacco, and flour manufs. Pop. 72,000.

Tagbilaran, a pueblo of the island of Bohol, Philippines, and cap. of the Bohol prov. Agriculture and fishing (turtles) are the chief industries. Pop. 10,000.

Taghanic Mountains, *see* TACONIC MOUNTAINS.

Tagliacozzo, a tn. and com. of Italy in the prov. of Aquila, 19 m. S.S.W. therefrom. Pop. of tn. 4517, of com. 9061.

Tagliacozzo, The Battle of, was fought in 1268 between Charles of Anjou and Conrad of Hohenstaufen,

grandson of the Emperor Frederick II., and resulted in the defeat and execution of the latter.

Tagore, Rabindranath, a noted contemporary Indian poet. He visited England (May 1913), and for the Indian Art and Dramatic Society read an English translation (from the Bengali) of one of his own lyrical works, *Chitra*. He has written plays, songs, and novels, as well as love-poems, hymns, and other verses. Prose translations of his *Gitanjali* (Song Offerings), made by the author himself, have been published by Macmillan & Co., Ltd. (1913), and W. B. Yeats has written an introduction to the volume. In Nov. 1913 he was awarded the Nobel Prize for Literature.

Tagus, the chief riv. of the Iberian peninsula, which rises in the Sierra Albarracin, in 40° 38' N. and 1° 35' W. It flows W.S.W. in Spain through New Castile and Estremadura, and then takes a more southerly course through Portugal. Above Lisbon it widens out from 3 to 8 m. and empties its waters by two arms into the Bay of Lisbon. The chief tributaries are the Albercho, Tietar, Jarama, etc., and the chief towns on its banks are Toledo in Spain and Lisbon in Portugal. It is navigable to Santarom, but the rapids impede its utility. Length 566 m.

Tahiti, or **Otaheite**, the largest of the Society Is. (q.v.), E. Pacific. It has an area of 400 sq. m., its appearance being very fertile, though not greatly cultivated. The chief products are coffee, sugar-cane, cocoa-nuts, bread fruit, yams, bananas, oranges, vanilla, etc.; cattle and pigs are raised, and wool, wax, pearl shells, rum, sugar, copra, etc., are exported. The capital is Papeete, and here the governor resides, who is assisted by a director and a privy council. The trade of Papeete is considerable, amounting to over £220,000 annually. Pop. 11,690.

Taihu, **Taihoku**, or **Taipefu**, a tn. of the island of Formosa, Japan, on the R. Tamsui, 13 m. from the port of Tamsui by rail. Pop. 10,000.

Taiheku, or **Tai-Peh-Fu**, the chief tn. of the island of Formosa, situated to the E. of Tuatutia. Tea, rice, and jute are grown. Pop. 90,000.

Taillandier, Saint-René (1817-79), a French man of letters, the son of a lawyer. He began by writing poetry, and then went to Germany, where he became professor of French literature at the University of Strasburg. Afterwards he gave lectures at the Sorbonne in Paris. He was elected a member of the French Academy in 1873. He wrote on the Revolution and on the Romantic movement of

the Young Germany of the beginning of the 19th century. *Histoire de la jeune Allemagne* and *Etudes littéraires* are his two principal works.

Taillé, in ancient French jurisprudence a tax tallage or subsidy; any imposition levied by the king or any other lord on his subjects. The effect of this impost, as it subsisted in France down to the end of the 18th century, was to discourage agriculture, for it was a tax upon the supposed profits of the farmer, as estimated by the stock upon the farm. The general result was that it was to the interest of the farmer to appear as small as possible, to employ very little in cultivation of the land and nothing in improvement. See Smith, *Wealth of Nations*, Bk. II.

Taillefer, a Norman hard and warrior of the 11th century who fought and fell in the battle of Hastings, 1066. Wace, in the *Roman de Rou*, says that he led the Norman troops, and sang before them of Roland of Charlemagne and of the heroes of Roncevaux. See Freeman's *History of the Norman Conquest*, 1875-79.

Tailor-bird (*Orthotomus sutorius*), a small bird, native of India and other parts of Asia, where it feeds on ants and other insects. It is about 6 in. long and of olive-green colour with markings of other tints. Its nest is a dainty structure of leaves joined together with silk, wool, hair, and vegetable fibre, and contains three or four vari-coloured eggs.

Tain, a royal and parl. burgh of Scotland, in the co. of Ross and Cromarty, on Dornoch Firth, 4½ m. S.W. of Dornoch. It has a collegiate church, founded in 1171 and restored in 1871-76. The wife of Robert Bruce sought sanctuary here in 1306. The industries are woollen manufactures and distilling. Pop. (1911) 1599.

Tainan (once Taiwan-fu), a treaty-port of Formosa, Japan, on the S.W. coast. It has a large trade. Pop. 50,000.

Taine, Hippolyte Adolphe (1828-93), a French historian, logician, and critic, born at Vouziers and educated at Collège Bourbon and Ecole Normale. After serving in the provinces under the ministry of Public Education, he returned to Paris (1852) and won his *D. ès lettres* (1853) with a critique on La Fontaine. The following year his essay on Livy gained the Academy prize; and he decided on literature as a profession. His writings of this period are *Voyage aux Pyrénées* principally of *Revue*, e.g. the 19th-century (collected edition 1857). Later works were the *History of English Literature*,

1863; *Philosophy of Art*, 1865; *The Ideal in Art*, 1867; *Critical and Historical Essays*, 1858 and 1865; *Theory of Intelligence*, 1870; *Notes on England*, 1872. His greatest work, the *Origins of Contemporary France*, was left unfinished. In 1863 he became an examiner at St. Cyr, and in 1864 a professor at the Ecole des Beaux-Arts; he received the Legion of Honour in 1866 and the Oxford D.C.L. during his second visit to England (1871). See Live: (1908), a shire's three-volume *Life* (1902-8).

Tai-ngan, a tn. of Shantung, China, 34 m. S.E. of Tsi-nan-fu. Pop. 46,000.

Tai-Peh-Fu, see TAIHOKU.

Tairen, Ta-lien, Dairen, or Talienswan, a bay and port of the Liao-tung Peninsula, Manchuria, on its eastern side, about 40 m. distant from Port Arthur. It was leased, together with the latter, in 1898,

twenty-five naval depôt, barracks, etc., and at this time the important port of Dalny was formed. It figured prominently in the Russo-Japanese wars, in naval actions, and in 1904 it fell into the hands of the Japanese. The bay is free from ice all through the year.

Tait, Archibald Campbell (1811-82). Archbishop of Canterbury, born in Edinburgh. He was educated at Glasgow University and Balliol College, Oxford. In 1856 he was made bishop of London, and twelve years later was raised to the primacy.

Tait, Peter Guthrie, a Scottish mathematician and physicist, born at Dalkeith in 1831, and educated at Edinburgh Academy, Edinburgh University, and Peterhouse, Cambridge. He became senior wrangler and first Smith's prizeman in 1852. In 1854 he was appointed to the professorship of mathematics in Queen's College, Belfast, and removed to Edinburgh in 1860 to occupy the chair of natural philosophy. In mathematics he is well known for his development of the theory of quaternions. His physical researches and experiments were mainly in connection with thermodynamics and thermoelectricity. He collaborated with Professor Thomson (Lord Kelvin) in the production of their *Treatise on Natural Philosophy*, with Balfour Stewart in writing the *Unseen Universe and Parallel Philosophy*, and with W. J. in *Matter, Dynamics, and Quaternions*. Biographical details may be found in

the *Life* by C. G. Knott, published in 1911.

Tait, William (1793-1864), a Scottish publisher, born in Edinburgh. He published *Tait's Edinburgh Magazine* (1832-46), an influential Liberal journal which numbered among its contributors De Quincey, J. S. Mill, Cobden, and Miss Martineau. He also published Brown's *Philosophy of the Human Mind*, Carlyle's *German Romance*, and Tytler's *History of Scotland*.

Taiwan, see FORMOSA.

Tai-yuan-fu, a walled city of Shan-si, China, and cap. of the prov., on the Fuen-ho R., with government arsenal, etc. Pop. 50,000.

Tajik, or Parsiwan, a Persian-speaking race of Afghanistan, representing the serving class of that country. The Ts. ('strangers') are an athletic race, fine fighters, and skilled farmers. They have assimilated the manners and customs of the Afghans, but are not nomadic. Pop. (est.) 900,000.

Taj Mahal, a famous mausoleum at Agra, built by Shah Jehan about 1629-50 as a tomb for his wife, Mumtaz Mahal.

Tajurra Bay, an inlet on the African coast and part of the Gulf of Aden. The small town of Tajurra is at its head.

Takaka, a tn. of South Is., New Zealand, 36 m. N.W. of Nelson. Pop. 2000.

Takamatsu, the cap. of Kagawa, on the N. coast of Shikoku Is., Japan. It has a noted landscape garden. Pop. 42,578.

Takaoka, a tn. of Toyama, Hondo Is., Japan, 10 m. N.E. of Kanazawa. It manufactures dyes and hardware. Pop. 33,603.

Takasaki, a tn. of Hondo Is., Japan, 63 m. N.W. of Tokio. It manufactures cotton and silk. Pop. 39,961.

Takata, a tn. of Hondo Is., Japan, 42 m. N. of Magano. It manufactures cotton goods. Pop. 25,000.

Takla-makan Desert, a desert of Eastern Turkestan, forming part of the Gobi Desert. It is bounded on the E. by Lob Nor, on the W. to the N.E. by the Tarim, and on the S. by the Kuenlun. It extends E. and W. for 600 m., and from N. to S. for about 200 m. It is traversed by the R. Khotan, whose course Mr. Caroy, in 1885, followed to its junction with the Tarim.

Takow, a treaty port on the W. coast of Formosa, Japan, 20 m. S. of Tainan; exports rice and sugar. Pop. 7500.

Taku Forts, a fort. village, Chi-li prov., N. China, near the mouth of the Pei-ho, 30 m. E. of Tien-tsin. It was taken by the French and English fleets in 1858-60 and successfully

held against several attacks, and again by the allied troops in June 1900 during the Boxer rising.

Talamancans, a native tribe of Central America, who formerly lived round Costa Rica.

Talavera de la Reina, a tn. of Spain, in the prov. of Toledo, on the Tagus, 75 m. S.E. of Madrid, in a fertile wine-growing district. It possesses very fine squares and streets, and has manufs. of silk and earthenware. Here, in 1809, Wellington gained a victory over the French under Bonaparte. Pop. 11,000.

Talbot (once Back Creek, or Daisy Hill), a township of Talbot co., Victoria, Australia, 42 m. S.W. of Sandhurst, is the centre of a gold-mining and agricultural district. Pop. 1200.

Talbot, an extinct breed of dogs allied to the bloodhound.

Talbot, John and Charles, see SHREWSBURY, EARLS OF.

Talbot, Richard, see TYRCONNEL, DUKE OF.

Talbot, William Henry Fox (1800-77), born at Laycock Abbey, Wiltshire. Educated at Harrow and Trinity College, Cambridge, twelfth wrangler. He worked chiefly in mathematics and optics and chemical changes of colour. Discovered the calotype process of photography (*q.v.*) for which he received the medal of the Royal Society, 1842. His photographic discoveries are related in his *Pencil of Nature*, 1844.

Talc, a hydrous bi-silicate of magnesia, which crystallises in the rhombic system (hardness 1, sp. gr. 2.8). Crystals are rare and the massive form 'steatite' or 'soapstone' is more common. French chalk, potstone, and figure-stone are all varieties of T. It is used as a lubricant, for making ornaments, and as fire stones in furnaces.

Talca, a northern prov. of Chile, with an area of 3739 sq. m. and a pop. of 146,700. Talca, the capital, is an important trade centre. The principal industry is the manuf. of woollen 'ponchos,' which are specially famous for their beautiful colours and durability. Pop. 43,600.

Talcahuano, see CONCEPCION.

Talchir Beds, in geology, comprise a part of the Gondwana series of S. India. The T. is distinguished by its remarkable conglomerate or boulder beds (of Permian age) which occur S. of the Nerbudda R., and also in the Punjab.

Talegallus, or Brush Turkey, a genus of Australian mound birds, which are brownish-black in colour, and when mature are about the size of a turkey. They form immense mounds of sand in which their eggs are deposited.

Talent (Lat. *talentum*; Gk. *τάλαντον*,

weight), a unit of weight adopted by the Greeks from the Babylonians. The same unit, or derivatives of it, became common throughout Syria, Egypt, and the Hellenic colonies. As gold and silver were not coined before about 700 B.C., the use of the balance for weighing out precious metals led to the employment of the unit of weight as a unit of value. Hence the term T. persisted as applied to money throughout the E. Mediterranean districts. The T. of scripture may, however, be taken as roughly equivalent to £400 or 1920 dollars. The use of the word to denote intellectual gift is derived from the parable of the Ts.

Tales, if for any reason a sufficient number of jurors do not appear at a trial, the judge can at the request of either party 'award a *tales de circumstantibus*' of persons present, i.e., join to the jury any one he chooses. This practically never occurs, for the full complement of a special jury would always be made up from the common jury panel, and of a common jury by taking some common juror in waiting from another court.

Talé-Sap, or Tonlé-Sap (literally, inland lake), a lake of Indo-China, situated partly in the N.W. of Cambodia and partly in Siam. During the summer monsoon the lake has an area of 800 sq. m. and about 50 ft. deep, and is fed by a branch of the Mekong R., but in the dry season its area measures barely 100 sq. m. with a depth of 4 or 5 ft.

Talfourd, Sir Thomas Noon (1795-1854), an English judge and author, born at Reading. His writings include: *Ion*, 1835, a tragedy produced by Macready; *The Athenian Captive*, 1837; *The Castilian*, 1853; *Letters of Charles Lamb*, 1837; and *Final Memorials of Charles Lamb*, 1849-50.

Ta-lien, see TAIREN.

Talienwan, see TAIREN.

Taliesin, a late 6th-century British bard, to whom is attributed the collection of poems known as *The Book of Taliesin*, printed in Skene's *Four Ancient Books of Wales* (1868). The poems are, however, of later date than the 6th century, and T. is held by some to be a purely mythological personage. Consult Stephens' *Literature of the Kymry*, 1849.

Tali-fu, or Tali, a city in the prov. of Tun-nan, China, on the shore of Lake Erh-hai and near Mt. Tsang-shan (6670 ft.), 165 m. W.N.W. of Tun-nan city. It was captured by the Mongols in 1250. On its surrender by the Mohammedan rebels in 1873, the population was almost exterminated by the Chinese. Pop. (estimated) 25,000.

Talisay, a pueblo of Cebú, Philip

pine Is., near Lipata Point, 6 m. S.W. of Cebú. Pop. 14,000.

Talisman, a charm engraved with suitable figures at some special time when the conjunction of the stars is propitious, which has the faculty of preserving its wearer from disease, etc.

Talking Machines, Instruments which record and reproduce sounds. The name is also applied to instruments which imitate sounds, e.g., speaking dolls. The instruments which record and reproduce sounds may be divided into two classes. The first class consists of instruments having cylindrical records, e.g., the phonograph and graphophone. The phonograph consists of a stretched membrane with a style at its centre. In the original Edison phonograph, invented in 1877, a cylindrical drum was wrapped in a sheet of tin foil. The style, which had a blunt point, rested on the tin foil. The person operating spoke into a cone-shaped mouthpiece, which focussed the vibrations on to the membrane. The membrane thus set into vibration causes the style to indent the foil to varying depths according to the vibration. During this operation the drum is made to revolve with a uniform velocity. The drum is then brought back to its original position and the style allowed to press against it so as to be always at the bottom of the indentation. The drum is then turned at the same rate as before, the membrane thus being made to execute the vibrations made on the foil, and thus give out the sound. Tainter and Bell improved on this instrument by substituting a cylinder made of wax instead of the tin foil. The mouthpiece is closed by a glass disc placed in front of the cylinder. A short lever is attached to the disc and on its other end a small sapphire cutting tool is fixed, being weighted so as to press against the cylinder. The cylinder is then made to revolve by means of regulated clockwork mechanism, at the same time travelling forward along its axis. The sounds are spoken into the mouthpiece and the indentation of wax. In the second disc of the lever, on which is fixed a blunt sapphire point, and the cylinder is made to revolve as before. In this instrument the original sounds are much better preserved than in the original Edison machine. The disc variety was introduced by Berliner, the engraving made by the stylus due to the vibrations being made on a disc which revolves on a turntable. The instrument is worked similarly to the phonograph. The great difference between the cylinder and disc instru-

ments lies in the engraving. In the cylinder instrument the stylus is made to vibrate in the direction of its length and so the engraving consists of an indentation of varying depths. In the disc the stylus vibrates sideways and so a wavy groove of uniform depth is cut in the disc. The record made as above described is called a master record. These are moulded and copies are made for commercial purposes. Copies of disc records are made by stamping them on the disc. For commercial purposes the cylinder machine is always used. It has been used for many years in the House of Representatives. Litigation has taken place as to whether the reproduction of works by these instruments is an infringement of copyright. The French Court of Appeal has decided that this is so, but no decision has been given by the British courts.

Talladega, a tn., cap. of Talladega co., Alabama, U.S.A., 85 m. N.N.E. of Montgomery. Pop. (1910) 5854.

Tallage, a burdensome tax of the Anglo-Norman and Plantagenet periods, imposed on the royal towns, boroughs, and demesne lands, and levied by a poll tax assessed at one-sixth of movables. By the statute *de tallagio non concedendo*, 1297 (an unconfirmed draft of the *Confirmatio Cartarum*, which latter document makes no mention of T.), it was provided that no T. should be taken without the consent of the commons. Notwithstanding the strict legality of imposition, the levy was strenuously resisted until Parliament abolished the tax altogether in 1340.

Tallaght, a par. and vil. in the co. and 6 m. S.W. of Dublin, Ireland. Pop. (par.) 3348.

Tallahassee, a city, co. seat of Leon co., and cap. of Florida, U.S.A., 26 m. N. of the Gulf of Mexico; has cotton factories. Pop. (1910) 5018.

Talla Water, a small riv. of Scotland in the S. of Peeblesshire. Its source is in the N.W. of Loch Skene, and it flows in a N.W. direction for about 6½ m. when it joins the R. Tweed, near Tweedsmuir Church.

Tallemant des Réaux, Gédéon (1619-92), a French author, born at La Rochelle. After having travelled in Italy, and taken his degree in civil and canon law, he was in command of the forces in Brittany, but he soon gave his time to literary labours. His chief works are *Historiettes* and *Cedipe*, a tragedy.

Talleyrand-Périgord, Charles Maurice de (1754-1838), was born at Paris. The effects of a fall when about a year old rendered him lame for life, and he was early destined for the church. He was sent to the Collège d'Har-

court, and thence to the seminary of St. Sulpice and to the Sorbonne. In 1780 he was appointed general agent of the clergy of France. In 1788 he was appointed bishop of Autun. As bishop of Autun he was a member of the *Etats Généraux* convoked in 1789. He was charged with the important task of preparing the report upon national education, which was read to the Assembly in Sept. 1791. The basis of the system advocated in this report was the secularisation of instruction. All parties agreed that he was the only man whose talents fitted him for the delicate mission to England. He was despatched in January 1792 to attempt to commence negotiations, but he was unsuccessful. After the accession of the Girond party to office, the attempt to ensure at least neutrality on the part of England was renewed. Chancelin was sent to England as nominal, and along with him T. as real ambassador. T. was at Paris when the events of Aug. 10 put an end to the monarchy. He fled to England, but the English government, after some time, ordered him to leave the country, and he was obliged to seek refuge in America. In 1797 M. de T. was appointed foreign minister under the Directory. He attached himself to the growing power of Bonaparte. The arrangement of the Concordat with the pope was accomplished by T., while the treaty of Lunéville, the treaty of Amiens, and the convention of Lyons all bear the impress of the peculiar views of M. de T. T., in 1807, resigned the portfolio of foreign affairs and accepted the nominal dignity of vice-grand-elect of the empire. In 1809 the ex-minister was so unreserved in his condemnation of the Spanish expedition that Napoleon deprived him of the office of chamberlain. When Paris capitulated, the emperor Alexander took up his residence in the house of the Prince of Benevento. M. de T. now exerted the influence he possessed over Alexander to obtain the combination of constitutional forms with the recognition of legitimacy. Louis XVIII. saved appearances by insisting upon being allowed to grant the charter spontaneously. T. was sent to the congress of Vienna, in Sept. 1814, where he obtained much more favourable terms for France than she would otherwise have had. M. de T. dictated the proclamation of Cambray. The constitutional monarchy, the object of his earlier wishes, was now definitely established. In his note of Sept. 21, 1815, he protested, as prime minister, against the new terms which the allies intended to impose

upon France. His argument was fruitless. Louis XVIII. howed to the dictation of his powerful allies; and M. de T. resigned office two months before the conclusion of the treaty. After the revolution of 1830 M. de T. was appointed ambassador to the court of Great Britain, 1830; and he held the appointment till 1835. During these four years M. de T. concluded the quadruple alliance of England, France, Spain, and Portugal, for the purpose of re-establishing the peace of the peninsula.

Tallien, Jean Lambert (1769-1820), a French revolutionist, born in Paris. He was employed successively in a lawyer's and a printer's office, and in 1791 made himself famous as the author of the Jacobin sheet, *L'Ami des Citoyens*, journal fraternal, placarded twice weekly on the walls of Paris. He subsequently became secretary to the Commune Insurrectionelle, representative of Seine-et-Oise in the Convention, and member of the Committee of General Security. In these various capacities he took part in the September massacres, the execution of Louis XVI., and the overthrow of the Girondists. T. became president of the Convention (1794), accompanied Napoleon to Egypt (1798), and was captured on his return by an English cruiser. For a time the English Whigs made a hero of him, but he returned to Paris in 1802 and was sent as consul to Alicante.

Tallis, Thomas (c. 1515-85), an English church-music composer, was organist at Waltham Abbey until 1540, and for the next twenty-seven years gentleman of the Chapel Royal, besides being with his pupil, Byrd, joint-organist there. In 1575 master and pupil were granted the monopoly of music-publishing for twenty-one years. The second prayer book of Edward VI., issued in 1552, created the demand for new church music, which T. was one of the chief to supply.

Tallow is composed chiefly of tristearin and tripalmitin, the glycerol esters of stearic and palmitic acids. It is obtained from beef and mutton suet by steaming under pressure in iron cylinders. The membrane or tissue is left and the T. or fat solidifies on cooling to a whitish stiff grease which is odourless when fresh, but which on exposure to air acquires a disagreeable smell. T. is used as a lubricant and in the preparation of soap. See SOAP, STEARIN, etc.

Tallow, a market tn. of Waterford, Ireland, on the R. Bride, 5 m. S.W. of Lismore; has woollen manufs. Pop. (1911) 1400.

Tallow Tree (*Stillingia sebifera*), a

Chinese tree which bears yellow flowers followed by small fruits, the seeds of which yield a wax used by the Chinese for making candles. The wood of the tree is very hard and is used in planing. Another tree (*Pentadesma butyracea*) bears large red flowers followed by edible berries. A thick yellow greasy juice exudes from the tree when cut.

Tally (Fr. *tailleur*, to cut), primarily a piece of wood on which notches are cut to represent numbers or amounts. Formerly it was customary among traders before the use of writing, to have two such sticks, one kept by the buyer and one by the seller, notched or scored with the amount of goods sold or the money due; and till comparatively late times small publicans and milk vendors kept their accounts in this fashion. The origin of exchequer bills is to be traced to the *tallies* which served the old Norman exchequer department for receipts and simple records of matters of account; and in times of financial stress exchequer tallies constituted accounts either of loans or sums for which that department held itself responsible. An exchequer T. was a squared piece of wood, on the sides of which the 'writer of the tallies' notched the amount lent, the name of the payer and the date; the T. was then cleft longitudinally into two parts in such a way that each part contained one half of each notch, one part being kept in the exchequer and the other issued to the lender, so that when the issued part was returned to the exchequer (usually in payment of taxes) it could be compared with the original. Hence the modern practice with cheques, which, when returned, should tally with the counterfoil. Clumsy as this contrivance was it was effectual in the prevention of forgery, and exchequer tallies were not finally discontinued till 1834.

Tally System, a system of dealing in London and other large towns by which articles are sold on credit to customers, the latter agreeing to pay the stipulated price by certain weekly or monthly instalments. The goods furnished are generally of inferior quality and the prices exorbitant. The system is open to great abuses and may often be ruinous to those—chiefly mechanics, workmen, and domestic servants—who resort to tally shops.

T. de France, Joseph (1762-1826), a French actor, and a French actor (1787). He founded the Théâtre Français in 1789.

Talmage, Thomas de Witt (1832-

1902), an American Presbyterian preacher, born at Bound Brook, New Jersey. He became pastor of a Reformed Church at Belleville, New Jersey (1856), whence he removed to Syracuse (1859), Philadelphia (1862), and Brooklyn (1869). He edited the *Christian at Work* (1873-76) and other religious periodicals, and wrote many books, including *Everyday Religion*, 1875; and *From Manger to Throne*, 1895. His printed sermons had a very large circulation.

Talmud, The (Aramaic, instruction), a name given to a collection of works dealing with the laws and ceremonial regulations of late or Rabbinical Judaism, together with a series of commentaries on these works. From this definition it is seen that the T. falls into two parts, known respectively as the *Mishnā* and the *Gemārā*. During the Exile, the Jews were prevented from carrying on the sacerdotal worship of the Temple, and so were unable to carry out the sacrificial law. There sprang up, therefore, schools of men learned in the law, and the observance of the Sabbath and the strict observance of the law took the place of the Temple system. On the return from the Exile, through the energetic action of Ezra the scribe and his supporter, Nebemlah, the Priestly Code was firmly established, and henceforth the observance of the law became the highest aim of the devout Jew. But before observance must come study, and hence arose schools which studied and commented on the law with the greatest care. Until about 100 B.C. these commentators are known as *Sopherim* or scribes. During the first hundred years of our era, however, the commentators are known as *Tannaim* or teachers. The last of these was the Rabbi Jehuda ha-Nasi, and it was he who gathered into a single body all the single pronouncements or *Halakoth* of his predecessors. Though other collections had undoubtedly been made before, it is this one pre-eminently which receives the title of *Mishna*. During the next three hundred years we find two schools of *Amoraim* or debaters, one in Palestine and the other in Babylon. The latter school was the more famous. They occupied themselves in commenting on the *Mishna*, but their comments have sometimes but the remotest connection with the subject. Hence the *Gemara*, or collection of expositions of the *Mishna*, contains a heterogeneous mass of legends interspersed with scraps from every department of the learning of the time. This is especially true of the Babylonian *Gemara*. The Babylonian *Gemara* (completed c. 520) and the T. from

the Babylonian T. are far more important than the Palestinian T. in their influence upon the later history of the Jews. The Palestinian *Gemara*, which was completed about the end of the 4th century, is much less complete, many parts being missing. The best edition of the Palestinian T. is that of Protokow (1898-1902). There is an English trans. by M. L. Rodkinson (10 vols., finished 1906), and a French trans. by Schwab (1878-90). See also Rodkinson's *History of the Talmud* (1903), and Strack's *Einleitung in den Talmud* (3rd ed. 1901). For a complete account of both works, with a complete bibliography and list of editions, see the *Jewish Encyclopædia*, vol. xii. (1901-6, 12 vols.).

Talpa europæa, see MOLE.

Talpidae, a family of fossorial insectivora with fore limbs well adapted for subterranean tunnelling. The mole (*g.v.*) is a typical member.

Taltal, a seaport tu. of Chile, in the prov. of Atacama, with an export trade in nitrate of silver, etc. Pop. 7000.

Talus, a name applied to the heap of detritus formed of the weathered and broken fragments falling from cliffs and rock slopes. It is of conical form, the material finding its natural angle of rest, which varies with the size and shape of the fragments.

Tamalpais, Mount, in Marin co., California, U.S.A., overlooks San Francisco Bay, 5 m. S.W. of San Rafael. Altitude 2606 ft.

Tamandua, a tn., state of Minas Geraes, Brazil, 160 m. W. of Ouro Preto. Pop. 8000.

Tamaqua, a tn. of Schuylkill co., Pennsylvania, U.S.A., on the Little Schuylkill R., 17 m. E.N.E. of Pottsville; has coal mines. Pop. (1910) 9462.

Tamar, a riv. forming the boundary between the counties of Devon and Cornwall, England, forms the estuary of the Hamoaze at Devonport and flows into Plymouth Sound. Length 60 m.

Tamarind (*Tamarindus indica*), a leguminous evergreen tree cultivated in India and other tropical countries for its hard, close-grained, heavy wood. It bears pinnate leaves and racemes of yellow, red-streaked flowers followed by legumes, the pulp of which is preserved in syrup; it is a gentle laxative.

Tamarisk (*Tamarix*), a genus of shrubs. The common T. (*T. gallica*) has become naturalised on the S. and E. coasts of Britain where it has been extensively planted to bind and cover sand-dunes. It is evergreen, and the bright green minute scale-like leaves and spikes of rose pink blooms are

borne on drooping reddish or purple branches.

Tamata, a gov. station, Papna, British New Guinea, 250 m. N.E. of Samarai, in a gold-mining district.

Tamatave, the most important port of Madagascar, faces the Indian Ocean, 140 m. N.E. of Antananarivo. Coral reefs nearly encircle the harbour and about one-half of the foreign trade of the island passes the port. The exports consist chiefly of animal products. Pop. 8761.

Tamaulipas, an Atlantic or Gulf state of Mexico, has an area of 32,128 sq. m. and a pop. of 249,253. Inland the surface is mountainous, dipping towards its lagoon-fringed shore on the Gulf of Mexico. There are large cattle ranches, and cattle and their products are exported. Cap. Victoria.

Tamayo y Baus, Manuel (1829-98), a Spanish dramatist whose parents were both actors. He began to take an interest in playwriting at an early age, and as his dramas were favourably received from the first, he soon resigned a position he held in the government in order to devote himself to dramatic art. He was a member of the Academy of Madrid. Principal plays are *La Locura de Amor*, *Virginia*, *La Bola de Nieve*, and *Els de Agosto*.

Tamazula, a tn. of Mexico in the state of Jalisco, and 24 m. E.S.E. of Ciudad Guzman. Pop. 9000.

Tambobong, or Malabon, a pueblo on the island of Luzon, Philippine Is., which forms a northern suburb of Manila. Pop. 21,000.

Tambo Grande, a tn. of Peru, in the dept. of Arequipa, 29 m. E.S.E. of Islay. Pop. 8000.

Tambour, see EMBROIDERY.

Tambourine, a percussion instrument consisting of a vellum head over a circular wooden frame in which 'jingles,' i.e. small cymbals loosely working on a centre-pin, are inserted. Played by rapping or rubbing with the hand, or by shaking.

Tambov: 1. A gov. of Central Russia, bounded on the N. by Vladimir and Nijni-Novgorod, on the E. by Penza and Saratov, on the S. by Voronezh, and on the W. by Orel, Tula, and Ryazan. It covers an area of 25,710 sq. m., and its surface is fertile, comprising wide valleys and plains, cut by deep ravines, while there is much forest-land in the W. The rivers are the Moksha and the Tsna, tribs. of the Oka, and the Voronezh and Khoper, tribs. of the Don. Coal, iron, limestone, gypsum, and clay are found. The crops are wheat, oats, rye, barley, potatoes, etc.; hemp and flax, tobacco and beetroot are grown. The chief

commercial towns are Tambov, Kozlov, Morshansk, etc. Pop. 3,412,900. 2. The cap. of the above gov., stands on the Tsna, and has a great grain trade and cattle mart. Pop. 52,942.

Tamerlane, see TIMUR BEG.

Tamil, a Dravidian language, spoken in S. India by over sixteen million people. The area over which it is spoken extends roughly from the city of Madras to the N. of Ceylon. It is closely akin to Malayalam, Kanarese, and Telugu. The earliest records of Tamil date from the 8th century A.D. Consult Caldwell, *Comparative Grammar of the Dravidian Languages* (2nd ed.), 1875; G. U. Pope, *First Lessons in Tamil* (7th ed.), 1904.

Tamisse, a tn. of E. Flanders, Belgium, on the Scheldt, near Ghent, with a lace-making industry and manufs. of cottons and woollen goods. Pop. 13,000.

Tammany Hall and Society. A huge New York party organisation established in 1789 and supported by the large miscellaneous population of more or less illiterate foreign immigrants to, and other less reputable elements in, New York City, which, by the corrupt manipulation of the alien vote and the most unscrupulous party tactics, gradually secured the complete control of the municipal government of New York. It was established as the Columbian Society, soon after Washington's installation as president, by an Irish-American, William Mooney, for social and charitable purposes. In 1805 it adopted the title of Tammany Society (apparently from the name of an Indian chief, Tammanena). With the rapid increase of its membership, twenty-five years after its foundation it espoused politics, and definitely allied itself with the Democratic party of New York; and with the help of the huge heterogeneous mass of Irish, Jewish, Russian, and German immigrants soon acquired (1836) an overwhelming influence in city politics. Favouring causes of its malign progress were the removal in 1842 of all restrictions on the city suffrage, the transfer to the people of the election of judges, and, generally, the corrupt nature of the new City Charter (1857), which vested all the chief administrative functions in the mayor and city departmental heads, and the power of raising and appropriating revenue to a joint body of the state legislature and a board of supervisors.

The *deus ex machina* of Tammany Hall was William Marcy Tweed (b. 1823), a chair-maker, and later foreman of one of the city volunteer fire

companies. In 1850 he became alderman of the common council of the city, amassed wealth by speculation, and eventually managed to get elected as district member in Congress, where, however, he proved a failure. Having obtained the post of public school commissioner in New York, and got elected to the Board of Supervisors, he became a member of Tammany Hall, and very soon permanent chairman of the general committee. Such social qualities as Tammany Hall then still possessed soon disappeared under the régime of Tweed and his satellites—Swceny, a lawyer of obscure origin; Oakey Hall, an American lawyer who had acted as lobbyist in the state capital, Albany; an auctioneer named Richard Connolly, and later, Albert Cardozo, a Portuguese Jew from the rival Democratic organisation, Mozart Hall. This latter organisation of the domagoguo Fernando Wood, coming over to Tammany Hall on the elevation of Wood to Congress, left Tammany undisputed 'boss' of city politics. Through the machinations of Tammany Hall, Cardozo got elected to one of the chief city judgeships, while George Barnard and John McCann of the Tweed group were awarded two important posts under him. By the most astonishing frauds of naturalisation and false registration through the Judge Cardozo, the proletarian electorate was increased from 10,000 to about 40,000, with the result that the Tammany ring easily secured the election of its chiefs to all the chief offices of the city and also of the state. The control of municipal funds by the abolition of the Board of Supervisors and the transfer of the powers of that body to the recorder and aldermen, gave the Tammany ring every opportunity to pillage the city treasury by projecting huge municipal schemes at exorbitant cost, making the most dishonest jobbing contracts by auditing the accounts of the old Board of Supervisors in such a way as to make it appear that large claims were outstanding against that board, and finally by inviting the contractors for the new county courthouse to add large sums to their bills, which were then promptly appropriated by Tweed and his accomplices. The city debt increased from \$36,000,000 in 1869, to \$97,000,000 in 1871, and there was next to nothing in the way of municipal improvements to justify it.

Tammany Hall suffered a severe blow in 1871 at the hands of a disaffected member named O'Brien, who 'gave the show away' to the *New York Times*. After the publica-

tion of details, Samuel J. Tilden, chairman of the Democratic party in the state (afterwards governor), conducted a vigorous campaign against the ring, with the result that Cardozo resigned, Tweed was put on his trial and sentenced to twelve years' imprisonment, Hall was tried three times but managed to escape conviction, Connolly fled, and the ring was broken. Its later history is associated mainly with the name of Mr. Richard Croker, one time keeper of a liquor saloon, and a clerk under Tweed. Mr. Croker held no civic office, but as chairman of the Tammany sub-committee, controlled all the city officials, and indeed inspired all the state legislative proposals at Albany. Its present organisation is held together by about one thousand voting districts, each under a 'captain' nominated by the Tammany committee, who nurses the voters; while the committee members of the society are annually elected by the different 'assembly districts' in the city boroughs. According to Mr. Bryce, the city majorities between 1902 and 1910 have given the city a purer and more efficient administration than it had previously enjoyed, and although the police and police magistrates and certain government departments may still be open to serious criticism, the political horizon of New York is 'bright enough to encourage the hope that the clouds which remain will ultimately pass away.' See Bryce's *American Commonwealth*; *Cambridge Modern History*; Tilden's *Origin and Fall of the New York Ring*.

Tammerfors, a tn. of Finland, in the gov. of Tavastehus, 102 m. N.W. by N. of Helsingfors, with manufactures of cotton, linen, paper, and woollens. Lumbering is also carried on. Pop. 64,000.

Tammuz, or Thammuz. Adonis appears to be the Phœnician personification of the sun, who during part of the year is, as the legend expresses it, with the goddess of the underworld, and during the remainder with the regent of heaven, namely Astarte.

Tamp, to ram packing, such as clay, earth, etc., on top of a charge of powder in a blast-hole drilled in the rock, etc. The word is also used of ramming down road-metal, etc. T. work in civil engineering is applied to a road made smooth by tamping.

Tampa, a city of Florida, U.S.A. the co. seat of Hillsboro' co., 240 m. S.W. by S. of Jacksonville. Being seated on Tampa Bay, it has become a popular winter resort, notwithstanding its large trade in phosphates, which is yearly exported to the value of over £1,000,000. Cigars are

largely manufactured. Pop. (1910) 37,782.

Tampico, an important port of Tamaulipas, Mexico, near the mouth of the Panuco on the Mexican Gulf, with large dockage and quayage and an important trade in maize, sugar, fruit, etc. Pop. 24,000.

Tamsui, a fort and treaty port of Formosa, Japan, on the N.W. of the island. It was bombarded by the French in 1884. Pop. 6000.

Tamus (Black Bryony), a genus of perennial climbing plants (order Dioscoreaceæ) with a large black tuber and a slender twining stem bearing numerous heart-shaped leaves and clusters of small green flowers followed by scarlet berries.

Tamworth: 1. A municipal bor. and market tn. of Staffordshire and Warwickshire, England, on the R. Tame, 110 m. N.E. of London. There are paper mills and clothing manufs., and in the vicinity large market gardens. Coal and fireclay are worked. There is an old castle surrounded by massive walls. Pop. (1911) 7738. 2. A tn. of New South Wales, Australia, in Inglis co., on the Peel and Cockburn rivers. It is a gold-mining centre, with saw- and flour-mills, coach-building works, etc. Pop. 6200.

Tan, or **Tan Waste**, the spent bark from T. plts, formerly, and still to some extent used in gardening for making hotheds and as a material in which pots are plunged. It decays very slowly and has little fertilising value, though it tends to improve the mechanical condition of heavy soils.

Tana: 1. A riv. of British E. Africa. Its course of 500 m. is very winding, and its current rapid. It rises near Mt. Kenia. The width is from 100 to 200 yds., and its banks are low and frequently flooded. It enters the Indian Ocean in 2° 40' S., about 110 m. N.E. of Mombasa. 2. A riv. of Finnmarken, Norway, formed by the junction of the Anarjokka and Karasjokka. Its course is winding and generally N.E., and it enters the Arctic Ocean by Tana Fjord. Length 250 m.

Tanacetum, see **TANSY**.

Tanager, a name for any bird of the family *Tunagridæ*, allied to the finches. They are natives of Central America, and nearly all of them have very brilliant plumage. One of the finest is the superb *T. fastuosa*; its plumage has a

shiny metallic lustre; the head is sea-green in colour, the breast is violet, and there is a flame-coloured patch on the lower part of the back. It feeds on fruit and insects, and is sometimes kept in an indoor aviary.

Tanagra, a city of ancient Greece, on the Asopus in E. Boeotia, the site,

now called *Chimarra*. m. S. Here it was built by the Romans in 301 B.C., but the following year the latter raised its walls to the ground.

Tanais, see **DON RIVER**.

Tanaland, a maritime prov. of British E. Africa, which is bounded by the Indian Ocean on its E. side. It covers an area of 34,000 sq. m., and it contains the districts of Lamu and Port Durnford. There is a considerable export trade carried on in Indian rubber, ivory, shells, horns, Indian corn, millet, etc. Pop. 102,000.

Tanana, a riv. of Alaska, U.S.A., and a trib. of the Yukon. Its source is in the N.W. of St. Elias range, and its direction is generally W.N.W. in the Yukon plateau. It joins the parent river on its S. bank opposite the town of Tanana. It is navigable for over 300 m.

Tananarivo, or **Antananarivo** ('the Thousand Towns'), the cap. of Madagascar, in the prov. of Ankova, near the middle of the island. It stands on a hill 7000 ft. above sea-level, and it is a well-built city, with houses on European lines. The town is healthy, and, with its suburbs, has a pop. of 94,813.

Tanauan: 1. A pueblo of Leyte Is., Philippines. Pop. 18,000. 2. A tn. on Luzon Is., Philippines. Pop. 20,000.

Tancred (1078-1112), the crusader who is the hero of Tasso's *Gerusalemme*, was the nephew of Robert Guiscard and the cousin, therefore, of Bohemund; he is sometimes represented as Guiscard's grandson. After taking part in the sieges of Nicea, Antioch, and Jerusalem, and the battle of Ascalon (1099), he became prince of Tiberias and Galilee, and for three years (1100-1103) acted as regent of Antioch.

Tanda, a tn. of United Provinces, India, in the Faizabad div., near the R. Gogra, 86 m. N.W. of Benares. It is noted for cotton goods. Pop. 20,000.

Tanderagee, a market tn. of Ireland in co. Armagh, situated on the Cusher, 5 m. S.E. of Portadown, with manufs. of linen and yarn. Pop. (1911) 1400.

Tandy, James Napper (1740-1803), an Irish patriot, born in Dublin. Secretary of the Society of United Irish-

America. In 1798 he went to Paris, and in consequence of the French Revolution planned and executed a rising in Ireland, which was assisted by French troops. It failed, and he was arrested. At the intervention of Bonaparte he was allowed to escape to France. See

R. R. Madden, *The Lives of the United Irishmen* (7 vols., Dublin), 1842-46.

Taney, Roger Brooke (1777-1864), an American chief justice, born in Calvert co. His ancestors were among the earliest settlers of Maryland, having emigrated in the time of Cromwell, and on his mother's side he was descended from Dr. Roger Mainwaring, Bishop of St. David's in the time of Charles I. He was educated at Dickinson College, Carlisle, Penn.; graduated 1795. Admitted to the bar in 1799, immediately entered political life and enjoyed the distinction of being the then youngest member of the House of Delegates of Maryland. Was soon employed in many of the most important causes in his part of the state, and grappled successfully in intellectual conflict with the foremost advocates of the time. In 1811 he successfully defended General Wilkinson, then commander-in-chief of the U.S. army, on a charge of treason, before the military court at Frederick, arising out of the suspension by the accused of the *habeas corpus* in 1806. In 1812 T., whose political sympathies had till then been Federalist, then transferred his adherence to the Republican party under Jackson, on account of the Federalist opposition to the war of 1812. In 1816 he was elected to the Maryland Senate, and in 1827 he became attorney-general of Maryland, later becoming attorney-general of the U.S., and then chief justice of the Supreme Court of the U.S., which post he held till his death. See also Van Santvoord's *Lives of the Chief Justices*, U.S.

Tanfield, a par. and vil. of Durham, England, on the Team, 12 m. N.W. of Durham, with coal mines, stone quarries, brick and tile works. Pop. (1911) 10,105.

Tanga, a bay and seaport on the E. coast of Africa, 75 m. N. of Zanzibar. It is a port of entry for German E. Africa. Pop. 5000.

Tangail, a tn. of Bengal, India, in the dist. of Maimansingh, 50 m. N.W. of Dacca. Pop. 32,000.

Tanganyika, a lake of E. Central Africa, situated between 3° and 9° S. It measures over 400 m. in length, and from 30 to 45 m. in width, with an area of 12,700 sq. m. Numerous small bays indent the shores, and many rivers flow into it. Its only permanent outlet is the Lukuja, which leaves the lake at its W. end to connect with the Congo. Among the principal places on the lake are Ujiji, Kavala, Karema, Pambere, etc. The S. part belongs to Britain, the E. to Germany, and the W. to Belgium.

Tangent to a curve is the straight line which passes through two coin-

cident points on the curve. In trigonometry the T. of an angle in a right-angled triangle is the ratio of the side opposite the angle to the adjacent shorter side.

Tangermünde, a tn. of Prussian Saxony, seated on the Elbe at its junction with the Tangor, 26 m. N.W. by W. of Brandenburg. Iron-founding, sugar refining, and shipbuilding are its chief occupations. Pop. 13,898.

Tanghinin, a deadly poison extracted from the kernel of *Tanghinia venenifera*.

Tangier, or Tangiers (Lat. *Tingis*, Arabian *Tanja*), a seaport of Morocco on a bay of the Strait of Gibraltar, 36 m. S.W. of Gibraltar; is the diplomatic headquarters and the second commercial city of Morocco. The town is surrounded by old walls and dominated by a ruined 'kasbah' (fort). The 'Great Sâk' (market-place) is the end of the Saharan and Sudan caravan routes. The value of the imports—tobacco, cotton, silk, flour, and provisions—in 1911 was £513,076, and of the exports—oxen, eggs, slippers, skins, and fowls—£366,673. T. was taken by the Portuguese in 1471, and held by England, to whom it came as the dowry of Catherine of Braganza, from 1662-84. By the Treaty of Madrid (Nov. 1912) it became the centre of an international zone of about 140 sq. m. and the northern terminus of the Tangier-Fez railway. Pop. 46,000.

Tangle Wrack, or Tangle Seaweed (*Laminaria*), a genus of olive-coloured unjointed seaweeds, some species of which, particularly *L. digitata* and *L. saccharina*, are both eaten while young.

Tanguts, a tribe which inhabits parts of Kansu, in China, and the Kuku-Nor and Khan districts in N.E. Tibet. They are of Mongolian origin and nomadic in character, their only wealth consisting of their flocks.

Tangye, James (1825-1913), born near Redruth, Cornwall. Founded with his brother the firm of Tangye Brothers, machinists, Birmingham, 1885. The firm made rapid strides under the advice of James and patented the hydraulic lifting jack, with which the launch of the *Great Eastern* was accomplished. He invented the T. engine, with overhanging cylinder, and greatly improved many methods of manufacture, designing 'jigs' and 'templates.' In 1862 the firm built and used a 'road locomotive,' capable of carrying ten people and attaining a speed of 20 m. per hour. He retired in 1872.

Tanis, or Zoan, an ancient city of Egypt, situated 20 m. N. of Tel-el-Kebir. The Tan or Zoan of the Bible, it is mentioned there as having

been founded seven years later than Hebron; it was probably the residence of Joseph. About the reign of Rameses II. T. was an important centre of commerce and was noted for its beauty and the fertility of the surrounding country.

Tanistry, in Ireland, an obsolete tenure of lands and the cause of many a family feud, by which the proprietor had a life estate only, to which he was admitted by election. Theoretically the descent went to the eldest or worthiest of the blood of the deceased life tenant. In practice the strongest succeeded.

Tanjay, or **Tanay**, a puchlo on the E. coast of Negros, Philippino Is., 15 m. N.W. of Dumaguete. Pop. 12,000.

Tanjore, **Tanjur**, or **Tanjävür**, a tn., cap. of Tanjore dist., Madras, India, 170 m. S.W. of Madras. It has a famous Hindu temple, the old palace of the rajahs, and a dismantled fort. The chief manufs. are carpets, silks, jewels, and metal work. It became British in 1799. Pop. 58,000. The district comprising the delta of the Cauvery R. is very fertile. Area 3700 sq. m. Pop. 2,250,000.

Tankersley, a tn. in the W. Riding of Yorkshire, England, 4½ m. S. of Barnsley. Pop. (1911) 2400.

Tanna, or **Thana**, the chief tn. of the Tanna dist., Bombay Presidency, India, on the E. coast of Salsette Is., 22 m. N.E. of Bombay. It was a place of importance under the Portuguese, and the cathedral was erected by them. It was taken by the British in 1774. Pop. 20,000. The district, including Salsette Is., has an area of 3570 sq. m. Pop. 812,000.

Tannahil, **Robert** (1774-1810), a Scottish poet. He was educated in Paisley, worked as a silk-weaver there, and committed suicide by drowning. James Hogg, the 'Ettrick Shepherd,' visited him in 1802. Many of his songs rank ve among them being *Braes o' Dun* and *Jessie the Flower o' Dun*.

Tanner, **Thomas** (1674-17. antiquary and ecclesiastic, educated at Oxford; became chancellor of Norwich diocese, 1701; canon of Ely, 1713, and of Christ Church, Oxford, 1724; and bishop of St. Asaph's in 1732. His best known works are: *Notitia Monastica*, 1695; and *Bibliotheca Britannico-Hibernica*. He contributed additions to Gibson's edition of Camden's *Britannia*.

Tannhauser, a legendary German knight, sometimes identified with a Minnesinger of the 13th century, who roved about the country. The legendary T. was also a wanderer, and finally came to the Venusberg or Hørselberg, near Eisenach, where he

abandoned himself to the sensual pleasures of the court of Lady Venus (Frau Hilda). Later he repented, was allowed to leave the court, and went to Rome to beg pardon from the pope. Pope Urban said the forgiveness of his sins was as impossible as for his staff to blossom, and T. returned to the Venusberg, and could not be found when the pope's rod began to sprout in three days. Wagner has treated the story in his well-known opera of this name, which slightly differs from the original legend.

Tannio Acid, or **Tannin**, $C_7H_6O_5$, occurs in gall nuts and all kinds of bark. It is extracted by boiling water and is an almost colourless, amorphous substance readily soluble in water. Its solutions possess a very astringent taste and with ferric chloride give a dark blue solution, and hence tannin is used in the manufacture of inks. T. is the anhydride of gallic acid, since it is converted into this acid by boiling with dilute sulphuric acid. Owing to its property of forming insoluble coloured compounds with many dyes, T. is used largely as a mordant and is also extensively employed in 'tanning' (see **LEATHER**). In medicine T. is employed in cases of diarrhoea, hæmorrhage, etc.

Tanning, see **LEATHER—Tanning**.

Tansa, a riv. in Thana dist., Bombay, India, whose waters have been enclosed by a dam. Since 1892 Bombay, 60 m. distant, has been supplied with water from this source.

Tansillo, **Luigi** (1510-68), an Italian poet, born at Vonosa, Polcenza; in 1535 became one of the bodyguard of Don Pedro de Toledo, viceroy of Naples, and later was appointed *capitano di giustizia* at Gacta. His works include: *Il vendemmialore*, 1534; *Le lagrime di San Pietro*, 1539, an

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posite plants with much divided leaves and solitary or corymbose, yellow flower-heads. The only British species is the common T. (*T. vulgare*), which is often abundant in waste places. The plant is bitter and aromatic, and has been employed as an anthelmintic. It was formerly used in the preparation of various dishes, notably T. pudding, a complicated mixture of herbs and food stuffs.

Tantah, a tn., cap. of Gharbīyeh prov., in the Delta, Egypt, 54 m. N.N.W. of Cairo; noted for its Mohammedan festivals. Pop. 54,000.

Tantallan Castle, a ruin on the N. coast of Haddingtonshire, Scotland,

3 m. E. of N. Berwick. It stands on a high precipice fronting the Bass Rock, and was the stronghold of the Angus Douglasses, from whom it was taken by the Covenanters in 1639. It was further destroyed by Monck, 1659.

Tantalum (Symbol Ta, At. wt. 183), a rare metal associated with niobium in the mineral 'tantalite' or 'columbite.' It is white in colour (sp. gr. 16.8) and can be drawn into wire of great tenacity and high fusing point (225° C). It has thus been used in constructing the filaments of electric lamps. The pentoxide is obtained when the metal is burned in air. Two oxides, however, are known, viz. Ta_2O_5 and Ta_2O_4 . The latter gives rise to the tantalates corresponding to the nitrates and metaphosphates. A characteristic salt is potassium tantalate, the potassium salt of hydrofluotantallic acid (H_2TaF_7), the latter being readily formed by solution of the pentoxide in hydrofluoric acid. The metal has been prepared from this salt by reduction with hydrogen followed by fusion 'in vacuo.'

Tantalus, a legendary Greek hero, son of Zeus and Pluto, and king of Sipylus, father of Pelops and Niope. He was admitted to the table of the gods, but abused this privilege and was cast into the lower world, where he stood in water which ebbed away when he stooped to drink it. Above his head hung branches of fruits which swung out of his reach whenever he tried to grasp them.

Tantalus, or Wood-ibis, a genus of wading birds of the Stork family (Ciconiidae).

Tantia Topi (c. 1819-59), the most brilliant of the native leaders in the Indian Mutiny. He was the successor of Nana Sahib, and on him the shame of the Cawnpore massacre chiefly rests.

Tantum Ergo, see PANGE LINGUA.

Taoism, see LAO-TSZE.

Taormina (ancient *Tauromentum*), a town and winter resort, Messina prov., Sicily, 30 m. S.W. of Messina; was founded by the Greeks (c. 398 B.C.), and has the ruins of a magnificent theatre. Pop. 4100.

Tap: 1. The device for allowing liquids to be drawn from containing vessels; simply a plug, spigot, or faucet. Also commonly applied to the cock, by turning which liquids are shut off or their flow regulated in a pipe. 2. Screw-taps are male screws, commonly in their grades for cutting the female screw in a hole previously drilled; the taper, middle, and plug taps are used in succession. A 'blank' of hard steel is accurately turned in the lathe and fluted by their longitudinal grooves; the heads are squared to enable them to be operated in a wrench.

Tapachula, a town in the state of Chiapas, Mexico, 102 m. S.S.E. of San Cristóbal, is the centre of a coffee-growing district. Pop. 21,689.

Tapajez, a river of Brazil, is formed by the confluence of the Arinos and the Juruena in the state of Matto Grosso, and flows in a N.E. direction for 1100 m. to its junction with the Amazon near Santarém. Navigation is impeded by waterfalls.

Tapestry (Fr. *tapis*, a carpet or table-cloth; Lat. *tapetum*, a carpet), a kind of fabric woven with a needle on canvas in wool or silk, sometimes enriched with gold and silver, used as a covering for the walls of a church or room. The term is sometimes used in a more extended sense to include coverings of furniture or carpets (see *Comedy of Errors*, act iv. scene 1). The use of the loom for the production of richly ornamented fabrics is derived from the Orient; many tapestries also appear to have been worked by hand. The curtains of the Tabernacle in the O.T. were probably worked in silk and gold. There is evidence to show that T. was much in favour among the Egyptians, and its practice was with the Babylonians connected with the exercise of their religion. The Ts. purchased by Nero for 2,000,000 sesterces were of Babylonian origin. The Greeks and Romans were also much addicted to the working of cloths in this way. Homer mentions several Ts., of which the most famous is that worked by Penelope in the *Odyssey*. During the middle ages Ts. were employed for the decoration of churches, and in the 12th and 13th centuries began to be used for private houses also. The latter use is said to have been due to contact with the East in the Crusades. In the 14th century the famous Fleming and French Ts. began to be made, those of Arras becoming very celebrated. Louis XIV. in 1666 helped to establish the 'Hotel Royal des Gobelins,' where the beautiful Gobelin Ts. were made till the end of the 18th century. The Bayeux Ts. are much earlier, and are said to have been worked by the consort of William I. to commemorate the conquest of England. T. is made to-day in much the same way as from the earliest times. A distinction is made between low-warp work, in which the weaver has the T. before him as on a table, and high-warp work, in which it is suspended as a veil. The warp being so stretched, the design is traced and then worked by hand with a needle. See M. B. Huish, *Samplers and Tapestry Embroideries*, 1913; H. C. Candler, *The Tapestry Book*, 1913.

Tapeworm, or Cestode, a class of parasitic flat-worms generally charac-

terised by long flat bodies and the absence of a digestive system. They form two groups, the *monozoa* or unsegmented cestodes, and the *merozoa* or segmented cestodes, which include the larger number of varieties. A segmented T. consists of a scolex or head, which bears suckers or hooks by which the animal attaches itself to the intestines of its host, a narrow neck, and numerous segments or *proglottides*, each of which is usually provided with generative organs, so that it is capable of independent existence and of reproduction when detached from the parent animal. The eggs are oval or spherical, and develop in the uterus into an embryo furnished with six hooks. When the embryo is swallowed by the fish or other animal which serves as intermediate host, it develops into a hydatid or bladder-worm (*q.v.*), containing its scolex invaginated or folded inwards. When the hydatid cyst reaches the final host, the scolex is evaginated, attaches itself to the wall of the intestine, and proceeds to develop and throw off proglottides. The Ts. parasitic in man are *Tania saginata*, from imperfectly cooked beef, *Tania selium*, from pork, and *Dibothriocephalus latus*, from fish. They lead to anæmic conditions and intestinal disturbances. In most cases they may be expelled by extract of male fern, taken after the intestines have been well purged.

Tapiau, a tn. of E. Prussia, on the R. Pregel, 24 m. S.E. of Königsberg. Pop. 5985.

Tapioea, see CASSAVA.

Tapir (*Tapirus*), a genus of ungulates allied to the rhinoceros, but with a short movable trunk, four front toes, and no horns. The skin hairy and very thick, and the tail rudimentary. They frequent forest and are nocturnal in habit, living chiefly on vegetable matter, though probably omnivorous. Of the five or six living species, one, the largest, is Malayan, and the rest occur in S. America, where they are often hunted. These are black in colour, but the Malayan species has dirty white hindquarters. Though powerful they are shy and inoffensive and are easily tamed, and their use in suitable countries as beasts of burden has been suggested. The thick hide is, however, of great value.

Taplow, a par. and vil. of Buckingham, England, on the Thames, 1 m. from Maidenhead, and 4½ m. from Windsor. Pop. (1911) 1060.

Tappet, a projecting piece on a revolving shaft or any other moving piece, so placed as to engage at intervals with a lever controlling some intermittent action. In certain types

of stationary engines Ts. are used to operate valves.

Tapping, in surgery, an operation occasionally performed for the purpose of drawing off an accumulation of dropsical fluid. A puncture is made through the overlying tissues and a small tube is inserted. The fluid then releases itself by its own pressure, or may be withdrawn by suction.

Taprobane, see CEYLON.

Tapti, a riv. of W. India, rising at an altitude of 2500 ft., in 20° 6' N., and 78° 21' E. Its length is 440 m., and it flows into the Gulf of Cambay.

Tar is a dark brown or blackish viscous liquid obtained by the destructive distillation of coal, shale, or wood. The principal kind of T. is coal T., and is described under that head. Wood T. is obtained chiefly from firs, pines, and larch trees, and is collected in cavities beneath the heaps or 'meilers,' in which charcoal is prepared. It is a thick, harsh-smelling liquid which is acid, due to the presence of acetic acid (pyroligneous acid), and contains paraffins, resins, etc. Creosote, paraffin, and pitch are produced from the T. which is used for wood and rope, etc. Wood T. is used medicinally in the preparation of ointments for skin diseases. About 20 per cent. of the products of the distillation of coal in coke ovens are liquid and go to make up a kind of T. very closely resembling coal T. Blast furnace T. yields phenols, hydrocarbons, and paraffin wax. Peat and lignite also form T. on destructive distillation.

Tara: 1. The name of an isolated hill (507 ft.) in co. Meath, Ireland.

until 500, and in 500 and 500. In 1843 one of Daniel O'Connell's mass meetings in support of legislative union repeal was held here. 2. A tn. of Siberia, Russia, in the gov. of Tobolsk, 244 m. S.E. of the city of that name, on the Irtysh. It has an export trade in furs, and cattle-breeding is carried on. Pop. 8000.

Tara, or Taro, the tuberous roots of *Colocasia* and other shrubby plants in the Pacific of the plant are eaten like spinach.

Tara Fern (*Pteris esculenta*), a common fern of the Australian region allied to the British bracken. Its root stock is eaten by plgs. and when roasted is a favourite food of the aborigines.

Tarai, a dist. in the Knmaun div. of the United Provinces of India. It covers an area of 776 sq. m., and (as its name implies 'moist land') it is most unhealthy. It is watered by the Deoha R., and many small streams. Elephants, leopards, and tigers abound. Pop. 118,000.

Tarakai, a large island of the Pacific off the coast of E. Siberia, Asia, between the Sea of Okhotsk and the Bay of Aniva, separated from the continent by the Gulf of Tartary.

Taranaki, a dist. lying in the S.W. of the North Is., New Zealand, with an area of 3811 sq. m., and a pop. of 45,000. Mostly forest land, the remainder is utilised for stock-raising and dairy-farming, much butter and cheese being produced. New Plymouth is the cap. and port.

Taraneon, a com. of Spain, and the cap. of the dist. Taraneon, 48 m. W.S.W. of Cuenca. Pop. 5300.

Tarantism, or Tarantulism, an epidemic dancing mania which spread over the greater part of Italy in the 16th and 17th century. The symptoms originated with a great dread of the bite of the tarantula, which, though sufficient to pierce the skin, is found to be incapable of giving rise to the hysteria and other symptoms of the mania. It is said that the *Tarantella* dance is called after it, by reason of the alleged curative efficacy of this rapid measure.

Taranto (the ancient *Tarentum*), a fort. tn. and seaport of S. Italy, in the prov. of Lecce, on the northern extremity of the Gulf of Taranto. It has a fine cathedral and monasteries, nunneries, hospitals, etc. The manufs. include velvet, cotton, soap, and oil, and there is a trade in olive oil, grain, oysters, mussels, etc. The islands of St. Peter and St. Paul, each having a lighthouse, protect the outer harbour. Pop. 65,000. See TARENTUM for history, etc.

Taranto, Gulf of, a gulf of the Mediterranean sea, bordered by the provinces of Cosenza, Potenza, and Lecce. It has a length of 70 m. and an average breadth of 20 m.

Tarantula, the name for various large, formidable-looking spiders, European and American, but correctly applied to a few relatively small species of the genus *Lycosa*. See SPIDER.

Tarapaca, a prov. of N. Chile, which may be divided into three districts, running from N. to S., parallel with the coast. The district nearest the coast has deposits of guano, sulphate of soda, and salt, and copper, silver, and nickel in the mountains; gold has also been found. A narrow strip, 3 m. in breadth and 250 m. long, to the eastward, contains large deposits of

nitrate of soda, whilst eastward again stretches the Pampa of Tamangal to the Andes, the only portion of the province where agriculture is practised.

Tarapoto, a tn. of Peru in the dept. of Loreto, 50 m. S.E. of Moyobamba. Pop. 9000.

Tarare (ancient *Taratrum*), a tn. in the dept. of the Rhone, France, 22 m. N.W. of Lyons. The chief industry is the manuf. of muslins (introduced in the 19th century); silk, plush, and velvet fabrics are also made. Pop. 13,000.

Tarascon, a tn. in the dept. of Bouche-du-Rhone, France, situated on the l. b. of the Rhone, 50 m. N.N.W. of Marseilles. The manufs. include cloth, serge, and silk, soap, etc. It is perhaps best known by Daudet's *Tartarin de Tarascon*. Pop. 9000.

Tarasheha, a tn. of Kiev, Russia, and 80 m. S. of Kiev city, with flour-mills. Pop. 15,000.

Tarasp, a vil. of Switzerland, in the canton of Grisons, Lower Engadine, 28 m. N.E. of St. Moritz. It is frequented for its mineral baths. Pop. 400.

Tarawera Mt., a peak of New Zealand, situated in the Hot Lakes District of the North Is., 90 m. N.N.W. of Napier. On June 10, 1886, an eruption destroyed the famous pink and white terraces of Rotomahana.

Taraxacum, a genus of composite plants with a milky juice. *T. officinale*, or *Leonodon taraxacum*, is the common dandelion. *T. montanum* is sometimes grown in gardens.

Tarazona: 1. A tn. in the prov. of Saragossa, Spain, situated on the Queiles, 40 m. N.E. of Soria. Pop. 9000. 2. A tn. in the Murcia prov. of Spain, situated 19 m. W.N.W. of Albacete. Pop. 5000.

Tarbagatai, a mountain range in Russian and Chinese Turkestan, extending over 200 m. Its highest point is Muz-tau (11,920 ft.), and the best pass is Say-assu, which leads to Chuguchak.

Tarbert: 1. A vil. of Argyllshire, Scotland, situated on Tarbert Bay, 30 m. N.N.E. of Campbelltown, with an ancient castle, erected by Robert the Bruce. Pop. 1900. 2. A vil., co. Kerry, Ireland, on the Shannon R., 6½ m. S.E. of Kilmish.

Tarbes, cap. of the dept. of Hautes Pyrénées, France, situated on the Adour R. 12 m. N.N.W. of Bagnères de Bigorre. It has manufactures of paper, flax, woollens, felt, machinery, etc. Pop. 28,000.

Tarbolton, a tn. of Ayrshire, Scotland, 6 m. E.N.E. of Ayr. Pop. (1911) 4593.

Tardieu, Jacques Nicolas (1718-95), an engraver, son of Nicolas Henri T.

(*q.v.*). He received his artistic tuition from his father, became a member of the French Academy, and reproduced pictures by Nattier, Vanloo, and Boucher.

Tardieu, Nicolas Henri (1674-1749), a French engraver, born at Paris; he lived there chiefly till his death. He was a member of the French Academy, and did many plates after Rubens, while his works also include a fine rendering of Watteau's masterpiece, 'L'Embarquement pour l'Île de Cythère.'

Tardieu, Pierre Alexandre (1756-1844), an engraver, nephew of Jacques Nicolas T. (*q.v.*). Besides doing numerous plates after the old masters he reproduced many portraits by his contemporaries, notably one of Marie Antoinette by Dumont and another of Napoleon by Isabey.

Tardigrada, Bear Animalcules, or Sloth Animalcules, an order of Arachnida. The name was formerly given to a family of Edentata, containing the sloths.

Tare, or Vetch (*Vicia sativa*), a leguminous plant with trailing or climbing stems and compound pinnate leaves and reddish-purple flowers. The tares of the parable (Matt. xiii.) are probably darnel (*Lolium temulentum*).

Tare and Tret, certain deductions made from the gross weight of merchandise in bags, cases, etc. The weight of the vessel in which the goods are packed is known as the tare, and the gross weight, minus the tare, is the net weight. The tare may be calculated by weighing a few packages and taking the average (*average tare*); or in some kinds of merchandise the packing cases are assumed to be of a certain usual weight (*customary tare*); or the *actual* tare may be ascertained. The allowance for loss in transit, waste, etc. ($\frac{1}{2}\%$ of the net weight) is known as *tret*.

Tarentum: 1. (Gk. *Τάρας*), a Greek colony, supposed to have been founded by Spartans (the only colony which Lacedaemonia possessed) about 700 B.C. The city was the residence of Pythagoras, and the headquarters of Pythagorism. After being autonomous until the 4th century B.C., T. was occupied by the Greeks, and in 272 B.C. was captured by the Romans. It revolted during the second Punic War, but was retaken in 207 B.C., and was subsequently an ally and (in 123) a colony of Rome. It was taken by the Saracens in 830. 2. A bor. of Allegheny co., Pennsylvania, U.S.A., situated 21 m. N.E. of Pittsburg. It has manufactures of glass. Pop. 5000.

Target, or **Targe**, the name given to the small round shield which was used by the wild Celts of Ireland and

Scotland. Such small Ts. came into very general use as armour ceased to be worn. From its similarity to the T., the objects at which archers, and later riflemen, aim at was also called a T. In archery a T. is a circular frame of straw, painted with concentric rings of $\frac{1}{2}$ in. width; there are five rings, counting respectively 1, 3, 5, 7, or 9 points. Until fairly recently 'match' Ts. of rectangular shape were solely in use for soldiers; the 'bull' counted 4 points, the inner ring 3, and either a 'magpie' (a shot in the second of the T.'s two rings) or an outer, 2 points. 'Service' Ts. which are now used in the British army consist of a brown head and shoulders shown against a dark canvas ground, etc. 'Disappearing' Ts., appearing and disappearing at irregular intervals, are also used. In naval shooting the T. is a large wooden creosote.

Targoviste, or **Tirgoviste**, the cap. of the dept. of Dambovitza, Roumania, 44 m. N.W. of Bucharest. It has some interesting old buildings and an important arsenal. Pop. 9500.

Targum, an Aramaic paraphrase of the O.T. There are ten known Ts., the oldest of which is supposed to have been that of Onkelos which is confined to the Pentateuch. The person and name of Onkelos have been for the last 300 years a *crux criticorum*. According to the Babylonian Talmud, Onkelos (son of Calonicus or Calonymus), the proselyte, composed the T. on the Pentateuch out of the mouth of R. Eliezer, and R. Yehoshua, who taught in the 1st and 2nd centuries. In the Jerusalem Talmud the same thing is related on the same authorities, and almost in the same words, of the proselyte Aquila of Pontus, whose Greek version of the Bible was much used by the Greek-speaking Jews down to the time of Justinian. From facts seen some still argue that Onkelos is but another name for Aquila, and that the Greek translator also wrote the T.

Tarifa (Rom. *Julia Joza* or *J. Transducta*), a seaport in the prov. of Cadiz, Spain, 20 m. W.S.W. of Gibraltar. This town, whose characteristics are quite Moorish, has a fortress on an island near by. It is engaged in tinning and sardine-fishing. Pop. 14,000.

Tariff (from *Tarifa*, a tn. in Spain, at the entrance of the Strait of Gibraltar, where duties were formerly collected), denotes a list or table of goods with the duties or customs to be paid for the same, either on importation or exportation, whether such duties are imposed by the government of a country or agreed on between the governments of two

states having commercial relations with each other. The present English policy is to impose only a few duties for purely revenue purposes (*see CUSTOMS DUTIES*), but prior to the changes of Sir Robert Peel, there were over one thousand dutiable articles. No more stringent protective system, though existing in the interests of revenue, could well be imagined than that of England at the close of the Napoleonic wars in 1815. Most articles of consumption, together with raw material, were subject to high duties, while foreign manufactures were in some cases prohibited, and in most, if not all, penalised under heavy differential rates. Yet in spite of all these duties, English manufactures prospered, owing to the complete disorganisation of industry on the continent and the application of inventions (*see also TARIFF REFORM*). On the continent up to about 1850 rigid protection, or in many cases, prohibition, prevailed, except in Prussia and Switzerland. The change came with the celebrated treaty between England and France of 1860 (the work of Cobden and Chevallier). The rapid growth of trade between the two signatories to the treaty soon led other European nations to safeguard themselves by concluding a veritable network of treaties, securing a lower scale of duties, and the stringent system of the Restoration of the monarchy in France at last gave place to one of low duties, and moderate protection on manufactures and the almost complete relief of raw material from duty. In Germany conditions were always somewhat different; prior to the *Zollverein* (*see CUSTOMS UNION*) there obtained among the states of the Germanic Confederation a moderate scale of duties based on the Prussian T. of 1818. Up to 1850 there was a gradual and retaliatory system of Ts., which only weakened after the Anglo-French treaty. After this a treaty was concluded between France and Prussia (1862), which three years later was extended so as to embrace the entire *Zollverein*. The Franco-German War, in its consequences, and a general wave of agricultural depression, caused a reaction to protectionist principles after 1870, and the result has been that most European countries, except Great Britain, are now protectionist, though Holland and Belgium have, generally speaking, adhered to the system of moderate duties. Most British colonial Ts. are protectionist, but nowhere perhaps is the contrast between English commercial policy and that of any other great country more marked than in the U.S.A., in which latter country

the protectionist principle began with the relief accorded in 1816 to 'infant industries' struggling against the competition of the English manufacturers. *See Bastable, The Commerce of Nations.*

Tariff Reform, the name specifically appropriated to the fiscal policy, inspired by Mr. Joseph Chamberlain, which seeks to end the long régime in England of free trade principles, and to replace it by a system of duties on imports. It need hardly be said that when at the close of last century Mr. Chamberlain took up this policy, there was nothing original in the idea of its application to the British commercial system. Rather did it require some fifty years ago all the economic brilliance of Mill, McCulloch, and others, working on the basic principles of Adam Smith, to repel the dogmas of the so-called 'Mercantile System' (*q.v.*); a mission which was accomplished in such thorough fashion that the policy of free importation which goes by the name of 'Free Trade' (*q.v.*) has remained to the present day. The political exponents of free trade principles in the early forties, when as yet the unrepealed Corn Laws appeared to obstruct every avenue to progress, were Cobden and Bright, the leaders of the 'Manchester School.' A war, however successful in its immediate result, is almost necessarily followed by a period of general distress, and as necessarily gives rise to political expedients to alleviate that distress. During the South African War of 1900 a corn-tax, ostensibly a temporary one, levied purely for war purposes, was imposed by the Conservative government. When later Mr. Ritchie proposed to remit the tax, many of the members of the Conservative party proposed, contrary to popular expectation, to retain the tax. Mr. Chamberlain, while agreeing to the remitting of the tax, so far as the colonies were concerned, was in favour of retaining it as against foreign countries. In the result the tax was wholly remitted (1902), but it was apparent to every observer of the political horizon that a serious rift had occurred in the Unionist party. Mr. Chamberlain at a speech in Birmingham outlined his views on T. R., or 'fiscal reform' as it was then called. His main idea, and it was undeniably a strong one, was that unless Great Britain revised its existing fiscal policy, no assistance for colonial development could come from the mother country. Mr. Chamberlain resigned, and shortly afterwards Mr. Ritchie, also a confirmed Unionist free trader, also

resigned. The extraordinary debacle of 1906, when the Liberals were returned by an overwhelming majority, indicated that the time was by no means ripe for any reversion to protectionist principles. Nevertheless the Unionist party continued, in opposition, to press the claims of T. R. on the attention of the electorate, though Mr. Balfour, as leader, revealed all his wonted dialectical subtlety in avoiding any direct pronouncement in favour of a 'wholehogger' policy as distinct from a mere system of *preferential tariffs* in the interest of the colonies, or, at most, a system of *retaliation*; which last system, however, as indicated below, is not easily distinguishable from either reciprocity (q.v., and COMMERCIAL TREATIES) on the one hand, or, on the other, *protection* pure and simple. Matters reached a climax when Mr. Lloyd George presented before parliament his celebrated Budget of 1909.

Different economic aspects of Tariff Reform.—As stated from a purely partisan standpoint by Mr. J. M. Robertson, M.P., T. R. endeavours 'to promote imperial union by fiscal methods, which mean the raising of imports of food, with rates for empire products a set-off to the burden of increased food-prices, it promises the workers that 'their wages will always increase faster than food prices, and they will have constant "work for all." But the protagonists of T. R. have repeatedly disclaimed any intention of taxing either food-stuffs or raw material, though, as will appear from a consideration of the arguments advanced in the articles PROTECTION and MERCANTILE SYSTEM, it is difficult to see how a tariff system can avoid such taxation, and, as shown above, the whole movement began in the desire to retain a war-tax on corn as a permanent impost. The weight of English opinion would seem to be against the assent to Protection or any exclusion of all out of some of the chief adverse body of opinion. The general productiveness of industry determines whether wages shall be high or low, and that the productive power of home industries depends not on any tariff but upon the guidance of dual self-interest. But it is probable that the Englishmen are still inclined to accept the truth of the doctrine of free trade, many think free trade is good only if followed in other countries as well as in England, or, in Mr. Bastable's words, 'the wisdom of unrestricted

commerce is believed to be contingent on its adoption by the other parties concerned.' In this connection must be noticed the distinctions between *Reciprocity* and *Retaliation*, though, inasmuch as both these principles involve placing restrictions on foreign trade as against allowing trade to follow out its own supposed natural laws, they are at bottom mere forms of protection. The advocates of reciprocity maintain that free trade is injurious unless other countries adopt it; those of retaliation, that free trade is good in itself, but that 'to revenge the injuries inflicted by foreign duties on us, or to compel their abandonment, we ought to impose corresponding duties on the goods of protectionist countries.' This distinction seems to offer no more than a contrast in motives, and in practical politics the two views are often hopelessly confounded. Mr. Bastable and Professor Sidgwick and others all think that none of the leading advocates of free trade ever believed that its advantage was dependent on its adoption by other trading countries; but it is at least a natural inference to suppose that a body of opinion in the past have always thought so,

both nations of England. The movement in this respect has not yet found expression in a revised tariff must be ascribed to the continued belief in the validity of the free trade principle as a theory, or, conversely, to the refutation of both reciprocity and retaliation by leading economists. 'Reciprocity,' says Mr. Bastable, 'assumes that restriction gives advantages to the nation that employs it, at the cost of still greater injury to foreigners,' an assumption based on the belief that trade is lucrative only to importers (the term 'dumping' in connection with the fear of overproduction is used contemptuously of surplus foreign goods, the price obtaining in the country of production which in its turn rests on the old fallacy that the wealth of a country is to be measured by the amount of money in its possession (see CURRENCY, MONEY). The fallacy of individual exchange, regaining, it is clear that commerce is the result in the comparative cost of production in different countries, or in other words of the fact that foreign trade supplies any given country with certain goods more cheaply than it could itself supply them. Tariff duties on imports must

pro tanto obstruct the realisation of this advantage; but though, if foreign countries removed their restrictions, the gain of the country of importation would be proportionately greater, that fact does not destroy the validity of the view that home restrictions alone are injurious (*see also* IMPORTS AND EXPORTS). Finally, it is to be observed that but little support for reciprocity is to be derived from the belief that protective duties fall wholly or partly on the foreigner. The catch-phrase 'make the foreigner pay' takes no account of the probable effect on prices to the consumer. Retaliation, in so far as it differs from reciprocity at all, does so only by reason of the fact that its advocates stoutly maintain their adherence to the principle of free trade, regardless of the fundamental meaning of that principle as expounded by Mill, Cobden, and others, who concur in defending it against all criticism founded on the supposed evils of 'one-sided economy.' Retaliatory duties would not inconceivably result in still higher countervailing duties on the part of the country against which they were directed, a result which would certainly render the adoption of universal free trade far more remote than ever. To take concrete instances, it is doubtful whether either the U.S.A., Canada, France, or Italy, have improved their commercial positions by means of retaliatory duties. Mr. Bastable says with considerable force that the strongest reason against the adoption of retaliation by such a country as England, whose imports are mainly food and raw material and exports mainly manufactured articles, is that foreign countries desirous of developing their manufacturing industries would not be deterred by threats of retaliation from a nation so advanced in trade, but would, on the contrary, rather welcome any check on their exports of raw material.

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the Fiscal Problem, 1903, and *Through Preference to Protection*, 1907; Stanwood's *American Tariff Controversies in the 19th Century*, 1903; A. C. Pigou's *The Riddle of the Tariff*.

Tarija: 1. A dept. of Bolivia. The chief industries are stock-raising and agriculture. Area 70,800 sq. m. Pop. 130,000. 2. The cap. of the dept., 180 m. S.E. of Sucre. Pop. 8000.

Tarik, *see* GIBRALTAR.

Tarim, the principal river of Chinese Turkestan, composed of the

Yarkand-darya, the Kashgar-darya, and the Aksu-darya. The Kouchet-darya, which drains Lake Bagrast Kul, flows into the T., as do the Khotan-darya and the Cherechen-darya when they are not dried up. The T. is a sluggish stream, shallow and tortuous, and after flowing by the side of the desert of Takla Makan, and through the oases of Yarkmakasgar, Aksu, etc., it dies away in the marsh of Lop-nor, after a course of 1000 m. The area of its basin is 354,000 sq. m., of which over a half consists of arid deserts, including those of Takla Makan, Gobi, and Kumtagh. The region has been explored by Sven Hedin. *See his Through Asia.*

Tarkastad, the cap. of a div. of the same name, Cape of Good Hope, S. Africa. Pop. 2200.

Tarlac, or **Tarlag**: 1. A prov., Luzon Is., Philippines. The chief products are rice and sugar. Area 1295 sq. m. Pop. 135,000. 2. The cap. of the above prov., 65 m. N.N.W. of Manila. Pop. 12,500.

Tarlatan, a gauze-like muslin used for ladies' dresses, etc. It occurs in white and colours and is often printed. **Tarare**, 22 m. from Lyons, is the chief centre of this manufl.

Tarleton, Sir Banastre (1754-1833), the son of a Liverpool merchant, educated at Oxford. He went out to America with Lord Cornwallis at the time of the beginning of the War of Independence. T. held several commands during the war, and was present at the battles of White Plains and Brandywine. He was besieged by the Americans in Gloucester, and was compelled to surrender. On his return to England, T. devoted himself to politics.

Tarlton, Richard (*d.* 1588), a comedian, was distinguished for his performance of the clowns of the old English drama. One of his last performances was in *The Famous Victories of Henry V.*; this was in 1588, at the Bull in Bishopsgate Street. T. is known to have written at least one play, *The Seven Deadly Sins*, which, though never printed, and now lost, was much admired. There is a portrait of T. in his clown's dress, with his pipe and tabor, in the Harl. MS. 3885; and a similar one on the title-page of a pamphlet called *Tarlton's Jests*, 4to., 1611. A copy of the former portrait is given in Knight's *Pictorial Shakespeare*, at the end of 'Twelfth Night.'

Tarn: 1. A dept. in the S. of France, once forming part of Languedoc, an old prov., and bounded on the N. by Aveyron. The chief rivers are the Tarn, Agout, and Aveyron, while it also contains the

spurs of the Cévennes. Its trade is connected with wine, wool, and silk goods, whilst coal, iron, and copper are to be found. Area 2231 sq. m. Cap. Albi. Pop. 324,090. 2. A river of France, rising in the Cévennes and flowing into the Garonne. The chief towns on its banks are Albi and Montauban. Length 225 m.

Tarn-et-Garonne, a dept. in the S. of France, originally part of the old dept. of Guienne. The chief rivers are the Garonne, Tarn, and Aveyron. Area 1440 sq. m. Chief products cereals, fruit, and wine. Chief manufs. woollen and silk goods. Cap. Montauban. Pop. 182,537.

Tarnopol, a tn. of Galicia, Austria, 78 m. E.S.E. of Lemberg. It distills spirits and manufs. flour. Pop. 33,853.

Tarnow, a tn. in Galicia, Austria, 164 m. W. of Lemberg, on the Danube. The chief building of interest is the cathedral, and the chief manuf. agricultural implements. Pop. 37,263.

Tarnowitz, a tn. in Silesia, Prussia, 45 m. S.E. of Oppeln. The chief industries are brewing and iron manuf. Pop. 13,574.

Taro, see TARA.

Tarots, see CARDS, PLAYING.

Tarpaulin, a large sheet of the coarsest kind of linen or hempen cloth, saturated with tar to render it waterproof. It is used for covering loaded wagons, the hatchways of ships, and similar things as a temporary protection from wet. See WATERPROOF.

Tarpeia, daughter of Sp. Tarpelus, the governor of the Roman citadel on the Saturnian hill, afterwards called the Capitoline; was tempted by the gold on the Sabine bracelets and collars to open a gate of the fortress to T. Tatius and his Sabines. As they entered they threw upon her their shields and thus crushed her to death.

Tarpon (*Megalops atlanticus*), a littoral fish plentiful in warm American seas. It grows to a length of 7 ft. or more, and to a weight of over 200 lbs., the scales, which are tough like thin horn, sometimes being as much as 5 in. in diameter.

Tarquinius, in ancient geography, a city of Etruria, 45 m. N.W. of Rome, near the modern Corneto. It was the original residence of Tarquinius Priscus, and one of the chief cities of the Etruscan League.

Tarquinius, the name of a family in early Roman history, to which the fifth and seventh kings of Rome belonged: *Lucius Tarquinius Priscus* (616-579 B.C.), fifth King of Rome, was beloved by his people on account of his wisdom and courage. He de-

feated the Latins and Sabines, and tradition relates that he also defeated the Etruscans. He was murdered after a reign of thirty-eight years. *Lucius Tarquinius Superbus* (534-510 B.C.), the seventh King of Rome. His cruelty and tyranny obtained for him the surname of 'Superbus.' But, though a tyrant at home, he raised Rome to great influence and power among the surrounding nations. He defeated the Volscians and took Gabii by stratagem. Owing to an outrage committed by his son, Sextus, on Lucretia, the wife of his cousin, Tarquinius Collatinus, Tarquinius Superbus and his family were exiled in 510 B.C. The people of Tarquinii and Veii espoused the cause of the exiled tyrant, and marched against Rome, but they were unsuccessful. T. next repaired to Lars Porcena, King of Clusium, who marched against Rome, but was induced to make peace with the Romans. Thereupon T. took refuge with his son-in-law, Mamilius Octavius, who induced the Latin states to declare war against Rome, but they were defeated in the battle of Lake Regillus. T. then fled to Aristobulus at Cumæ, where he died.

Tarragon (*A Artemisia Dracunculus*), an aromatic perennial plant, the green or dried leaves of which are used for flavouring vinegar, and also in cookery. The plant is propagated by division or by cuttings in spring.

Tarragona: 1. A maritime prov. in the N.E. of Spain, bordering on the Mediterranean Sea. It has an area of 2505 sq. m. and a pop. of 339,042. On its fertile mountain slopes are vineyards and orchards, producing excellent wine and fruit. There is much forest land, yielding valuable timber, whilst copper, lead, silver, lime-stone, and marble are found. 2. (Ancient *Tarraco*.) A seaport and the cap. of the above prov., is situated at the mouth of the Francolí, 45 m. W.S.W. of Barcelona. It stands on an eminence about 600 ft. high, and partly on the low ground beneath it, forming an upper and a lower town, both of which are fortified. Among its archaeological remains are an amphitheatre, theatre, circus, and aqueduct. It is an archbishop's see, with a fine cathedral and palace. The port carries on considerable trade, but its harbour can only accommodate coasting vessels. T. was originally a Phœnician settlement. Later it was captured by the Goths and ruined by the Moors. Rebuilt in the 11th century it has in turn been captured by the English (1705) and pillaged by the French (1811). Pop. 25,000.

Tarragona, a port wine of a tawny type, produced in Catalonia, Spain.

It is also the name of an Australian red wine.

Tarrasa, a tn. in the prov. of Barcelona, Spain, 15 m. N.W. of Barcelona. The chief manuf. is woolen cloth. Pop. 16,000.

Tarruntenus Paternus, a Roman jurist, was the author of *De Re Militari*, two excerpts from which are in Justinian's *Digest*.

Tarrytown, a vil. of New York in Westchester co., on the Hudson R., 25 m. N. of New York City, famed as the 'Sleepy Hollow' of Washington Irving's story. He lies buried here. Pop. (1910) 5900.

Tarshish, a place or region which is mentioned several times in the O.T. It was probably the ancient Tartessus, and was situated in Spain near the mouth of the R. Guadalquivir. Tartessus was a noted centre of commerce. See Ezek. xxvii. 12, etc.

Tarsipes rostratus, the Noolbenger, a tiny marsupial, native of Western Australia. It is arboreal in habit, and feeds largely on honey, which it extracts with its long tongue.

Tarsus, a city of Cilicia in Asia Minor, on the R. Cydnus, represented to-day by the modern Tersus. It is now chiefly remembered for its connection with St. Paul. See Sir W. M. Ramsay's *Cities of St. Paul*.

Tagliaia, Niccolo (c. 1500-57), born at Bresela. He was mainly interested in the scientific and mathematical problems of gunnery and the art of warfare, particularly in projectiles. In 1521 he was a teacher of mathematics in Verona, and discovered a method of solving certain cubic equations. His chief works are: *Nova Scientia*, 1537, and *General Trattato di Numero e Misura*, 1556 and 1560, the latter dealing with arithmetic, algebra, geometry, and mensuration.

Tartan, or Plaid, a pattern woven in cloth, in which bands of different colours are woven or printed side by side, both the warp and weft way of the material, thus giving the well-known checkered pattern. The so-called shepherd's plaid of Scotland is known to have a very remote antiquity amongst the eastern nations of the world. These plaids were in great favour in the Highlands of Scotland, where each clan wore a particular kind as its distinctive dress.

Tartar Emetic, or Potassium Antimonyl Tartrate ($C_4H_4O_6K(SbO) + \frac{1}{2}H_2O$), is prepared by boiling potassium hydrogen tartrate with antimonious oxide and water. It is readily soluble in water, and is used in dyeing as a mordant and in medicine as an emetic.

Tartaric Acid, or Dihydroxysuccinic Acid ($C_4H_4O_6$), is a commonly occurring vegetable acid, and is con-

tained in grapes and other fruits. During the later stages of the fermentation of grape-juice, impure potassium hydrogen tartrate or argol is deposited. From this salt the commercial acid is prepared. The crude argol is partially purified by recrystallisation from hot water, and it is then boiled in solution with chalk. Calcium tartrate is deposited and the T. A. is set free from this by treating with dilute sulphuric acid. The acid forms large transparent crystals, is readily soluble in water and alcohol, but insoluble in ether (melting point $167^\circ C.$). Like other dicarboxylic acids, it forms both hydrogen and normal salts. The acid salt is known as 'cream of tartar' and the potassium sodium salt as 'Rochelle salt.' T. A. is used in the preparation of effervescing drinks and in baking-powders. There are four optical isomerides of the acid, viz. dextro-tartaric, laevo-tartaric, meso-tartaric (inactive), and racemic acid (inactive).

Tatars (properly Tatars), a term applied somewhat loosely to mixed races inhabiting parts of Siberia, Turkestan, and the Steppes. They are, in fact, a Mongolo-Turki people, though the name was first given to certain tribes of the Tunguses. In the middle ages, however, it was made to include the warriors of Mongolian and Turkish origin who followed the redoubtable Genghiz Khan, and whose exploits and deeds of savagery left so lively an impression on Europe. Indeed, it was probably about that time that their original name of 'Tatar' became altered to 'Tartar,' from a fancied connection with the Greek word *tartaros*, hell. The fierceness of the T. has passed into a proverb. In modern times the word is used to denote a heterogeneous variety of tribes, including the Kirghiz, a nomadic race inhabiting the Steppes, the Kalmucks, Kipchaks, and Crim Ts., the blending of the races, and the mingling, in varying degrees, of Mongolian and Caucasian characteristics, being exceedingly puzzling to ethnologists.

Tartarus, son of Æther and Ge, and by his mother Ge the father of the Gigantes, Typhoeus and Eohidna. In the *Iliad* T. is a place beneath the earth reserved for the rebel Titans, as far below Hades as Heaven is above the earth. Later poets use the name as synonymous with Hades.

Tartary, or Tatar, a term formerly given to Central Asia, on account of the inroads of Tartar hordes in the middle ages. It comprised the whole central belt of Central Asia and E. Europe, from the Sea of Japan to the Dnieper, including Manchuria, Mon-

golia; Chinese Turkestan, Independent Turkestan, the Kalmauck and Kirghiz steppes, and the old khanates of Kazan, Astrakhan, and the Crimea. But latterly the term had a more limited significance, and included only Chinese Turkestan and W. Turkestan.

Tartini, Giuseppe (1692-1770), an Italian composer and violinist of the same tradition as Corelli and Vivaldi, born at Pirano. In 1728 he started a violin school. His compositions for violin comprise over 100 sonatas and as many concertos, including the famous *Devil's Trill* sonata.

Tarudant, the cap. of the prov. of Sus, Morocco, about 125 m. S.W. of Morocco, and between the R. Sus and the Atlas Mts. The chief minerals are copper, gold, iron, and silver, while copper goods are manufactured, and dyeing and tanning carried on. Pop. (estimated) 35,000.

Tar Wood, see TAR.

Tasgaon, a tn. in the Satara dist., Bombay, India, 58 m. S.E. of Satara. Pop. 11,500.

Tashi Lama, or Teshu Lama, one of the two great lamas of Tibet. He is the head of the great monastery of Tashilhunpo, and while he does not possess the secular authority of the Dalai Lama, he is equal to him if not superior spiritually. During the absence of the Dalai Lama after the British Expedition of 1904, he was the head of Lamaism in Tibet. See LAMAISM.

Tashkend, or Tashkent, the cap. of the gov.-general of Russian Turkestan and of the ter. of Syr-Daria, situated on a trib. of the Syr-Daria, 160 m. N. of Samarkand. The city is divided into two—the native one and the new Russian one—and is well built and has many large public edifices. The trade of the city is important, the chief manufs. being leather goods, metals, and textile fabrics. Pop. 165,000.

Tashkurhan, the chief place in the dist. of Khulm, Afghan Turkestan, 4 m. S. of the ruined town of Khulm. It is an important trading centre. Pop. 10,000.

Tashi, a tn. in Bhutan, 13½ m. S. of Thimphu, has a large pop. (c. 1602-59).

Tasman, James (c. 1602-59), an English explorer. The exact date of his birth is not known, but the date above given is surmised. He was commissioned by the governor-general of Batavia, Van Diemen, to discover the 'Great South Land.' Whilst on this exploit he was successful in discovering Tasmania which he at first named Van Diemen's Land, 1642. An English edition of his journal from 1642-44 was published in 1898.

Tasman Glacier, situated in the S. of the South Is. of New Zealand; it was discovered in 1862 by Julius von Haast. It has a total area of just over 20 sq. m., and lies practically at the base of the mountain heights of the Southern (New Zealand) Alps.

Tasmania. This island, which forms the seventh state of the Commonwealth of Australia, is separated from Victoria by the Bass Strait which is about 140 m. wide. In area it is a little smaller than Scotland, and is the smallest of all the Australian colonies as well as the most temperate and pleasant. The N. coast forms a concave curve flanked by the island groups of Furneaux (E.) and the Hunter and King Is. (W.). The northern and westerly coasts are not greatly indented, but have some good harbours. The E. coast is much more indented, whilst the S. and S.E. coasts are formed of a series of curiously shaped peninsulas. Area, including dependent islands, 26,215 sq. m. Pop. 190,898.

Configuration and rivers.—The island is made up of ancient palaeozoic strata which have been penetrated by the harder masses of igneous rocks. The whole of the surface of the island is broken up by the full rivers into gullies and steep mountain slopes. Running almost parallel to the E. coast is an irregular range of mountains which finds its highest point in Ben Lomond, which rises to a height of 5000 ft. A line of depression formed by the river valleys of the Tamar, Macquarie, and Coal Rs. forms a natural means of communication between N. and S. The whole of the centre of the island is a plateau which, as it proceeds westward, breaks up into short mountain ranges and culminates in Mt. Cradley (5070 ft.). About the centre of the island and practically at the highest point of the plateau lies a number of freshwater lakes. The largest of these is the Great Lake which lies at an elevation of nearly 4000 ft. and which has an area of about 48 sq. m. The chief rivers of the island are the Derwent, rising in Lake St. Clair and entering the sea at Storm Bay (130 m. long); the Huon, which enters the sea at D'Entrecasteaux Channel (100 m. long); and the Tamar, which in reality is an estuary formed by the junction of the Esk and the Macquarie, which drain the E. depression and receive tributaries from the lakes of the centre.

Mineral resources.—The country is on the whole very rich in mineral resources. The chief mining industry is tin, which is mined in great quantities at Mt. Bischoff and at Braamhoek. Copper and antimony are

found at Mt. Lyell, and silver is mined in the W. Iron is found in most parts of the island, and coal is also fairly plentiful. Amongst other minerals found in greater or less quantities are bismuth ore, slates, marble, and building stone.

Climate, etc.—The climate is mild and equable, resembling that of the southernmost parts of the British Isles. The vegetation of the island is practically identical with that of Australia; the eucalyptus is the most predominant feature. The island is very well wooded, and the interior still yields a valuable supply of timber. The fauna in general is that of Australia, but there are one or two species peculiar to the island, i.e. the Tasmanian devil and the tiger or striped wolf, which, because of the enormous damage it did to the sheep, is now practically extinct. The platypus is more common in T. than in Australia. Fish of all kinds are found in great abundance.

Industries and trade.—Sheep rearing and agriculture are the principal occupations. Fruit and hops are grown in huge quantities for exportation. The leading exports are wool, gold, silver, and tin, and the chief imports are textiles, manufactured goods, and provisions. The chief trade of the island is carried on with Victoria and the British Isles. The principal towns are connected by railway, but the inter-communications are as yet not good. The main railway line runs between Hobart and Launceston, the chief towns. Total imports (1911) £3,309,506; exports (1911) £4,529,331. This includes inter-state trade.

History and government.—T. was originally called Van Diemen's Land, and was discovered by Tasman in 1642. In 1777 it was visited by Cook, who, however, thought that it formed part of the mainland. It was proved an island by circumnavigation by Bass and Flinders in 1798, and in 1803 was annexed by the British Crown as a dependency of New South Wales. The site of the present capital was originally a convict settlement, and the transportation of convicts to the island continued until 1853. The island was granted responsible government in 1856, and the name of the island was changed to T. The Houses of Parliament consist of a House of Assembly and a Legislative Council, whilst the Governor represents the King. The Parliament is elected by both sexes.

Aborigines.—These numbered in 1803 about 5000, but they are wholly extinct now, the last of them having died in 1876. The British treatment towards them was cruel, and for the

first thirty years after the settlement a constant war was waged between native and settler. Finally, about 1850, some attempts were made to preserve them on reservations, but the attempt ended in failure.

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Tasmanian Devil (*Dasyurus ursinus*), a marsupial which occurs only in Tasmania. It bears an external resemblance to a small bear with a long tail, and is brownish black in colour with a broad white band across the chest. It is very fierce and blood-thirsty, and often destroys poultry and even sheep.

Tasman Sea, the name given by the British Admiralty to the Pacific waters which lie between New Zealand and Australia and Tasmania.

Tassie, James (1735-99), a gem-engraver and modeller, born at Pollokshaws near Glasgow. He met Quin at Dublin and with him invented the 'white enamel composition' which he used for his medallion portraits and reproduction of gems. The 'Descriptive Catalogue' (1791) of Rudolph Eric Raspe enumerates 16,000 pieces from his hands, but before his death this had reached 20,000. His nephew, *William Tassie* (1777-1860), was also an engraver and modeller, and won the lottery for Boydell's Shakespeare Gallery in 1805. He executed, amongst other works, a very fine portrait of Pitt.

Tasso, Bernardo (1493-1569), born at Venice. A poet of high contemporary standing, now remembered rather as the father of Torquato T. (q.v.) than as a lyrical poet. Technically skilful his poetry was marred by exaggeration and bombast, imitating Petrarch and Ariosto. Educated at Padua, he became secretary to Prince Sanseverino of Salerno. His works, mostly published posthumously, include *Amadigi* (1560), *Floridante* (1587), *Lyrics* (1749). *Life* by G. Camperli.

Tasso, Torquato (1544-95), one of the finest and most widely influential Italian poets, son of Bernardo T. (q.v.), born at Sorrento. In 1560 he was sent to Padua to study law, but, influenced by the literary environments of his early years at Rome and Venice, he devoted himself to literature and philosophy. Two years later he produced *Rinaldo*, a romantic poem dedicated to Cardinal Luigi d'Este, who later became his patron (1565). From 1578-86 T. was imprisoned in a madhouse, probably on account of his extreme eccentricity and religious mania. Meanwhile, *La*

Gerusalemme Librata had been completed (1575) and submitted to several critics. On his release T. went to Mantua as the protégé of Prince Vincenzo Gonzaga, and here he rewrote his great epic in accordance with his critics' suggestions. The result, *La Gerusalemme Conquistata* (1592), was a feeble, pedantic effusion, in which he expurgated the fine passages of paganism and chivalry of the original edition on which his fame ultimately rested, e.g. those relating to the characters Erminia, Clorinda, and Armida. The last few years of his life were passed between Naples and Rome. In 1594 he was summoned by the pope to be crowned poet laureate, but he died on his arrival in Rome at the convent of Sant' Onofrio, without receiving the honour. T.'s poetry was an attempt to reconcile classic form (e.g. the Virgilian epic in *Rinaldo*) with a deeper note of personal sentiment. Besides *La Gerusalemme* his works include a delightful pastoral drama *Amita*, a weak tragedy *Torrismondo*, a rather brutal comedy *Gli Intrichi d'Amore*, and many other plays and poems. *Works*, ed. Rosina, 33 vols. (Pisa); *Lives* by Milman (1850) and Hasell (1882).

Tassoni, Alessandro (1565-1635), an Italian poet, born at Modena. He was employed in several diplomatic missions when secretary to Cardinal Ascanio Colonna (1599-1608), and later in the service of the Duke of Savoy. *La Secchia Rapita* (or 'The Rapo of the Bucket'), a burlesque epic; *Pensieri Diversi*; and *Considerazioni sopra il Petrarca* are his principal works.

Taste, in physiology, the sensation caused by the application of certain substances in solution to organs situated on the tongue, and to a lesser degree on the soft palate, the uvula, and adjacent structures. The terminal organs of T. are small oval bodies known as taste-bulbs, less than $\frac{1}{16}$ in. in length, and distributed unequally, but in enormous quantities, over the surfaces susceptible to the sensation. Substances which excite the sensation of T. must be in solution. The process is probably dependent on chemical changes taking place inside the taste-bulb, and evidence is forthcoming which tends to prove that each taste-bulb is only capable of communicating one variety of sensation. Four Ts. are usually identified—sweet, bitter, acid, and saline. All the other delicately differentiated sensations usually referred to the sense of T. are really smell sensations.

Tata, Yamsetji Nasarwanji (1839-1904), a Parsee merchant and philan-

thropist, born at Nosari in Baroda. He formed a company to work the iron ores of the Central Provinces on modern principles, and effected the lowering of the freights on Indian goods to China and Japan. He also introduced a silk industry after Japanese methods into Mysore, and endowed a research institute at Bangalore.

Tatar, see TARTAR.

Tatar-Bazarjik, a tn. of Eastern Rumelia, Bulgaria, 23 m. W. of Philippopolis, on the Maritza. Pop. 18,000.

Tate, Sir Henry, Bart. (1819-99), founder of the 'Tate Gallery' of British art, born at Chorley in Lancashire. He was a sugar merchant, but spent all his leisure in devotion to the fine arts, and made a collection of pictures which he afterwards gave to the nation.

Tate, Nahum (1652-1715), an Irish poet, born at Dublin. He issued several volumes of poems, and was the author of some indifferent plays. His poem, *Panacea, a Poem on Tea*, is perhaps his best effort. In 1692 he was appointed poet laureate, and ten years later the office of historiographer-royal was bestowed upon him.

Tatham, John (fl. 1632-64), a dramatist, was the author of the text of several city pageants, and wrote some plays and poems.

Tatian, the first Christian apologist, flourished in the latter part of the 2nd centry. He was a Syrian from the region of Mesopotamia. He was a Sophist and taught rhetoric with much success. Coming to Rome, he was converted to Christianity and became a disciple of Justin Martyr. He is famous as the author of *An Apology to the Heathen*, in which he defends the Christian faith and practice. He also wrote two lost works, *A Harmony of the Gospels* and *Perfection after the Pattern of the Saviour*. The *Apology* is generally printed with the works of Justin Martyr.

Tati Concession, a gold-mining dist. of the British Bechnanaland Protectorate, with an area of 2500 sq. m., which was originally conceded by Lobengula in 1887. Chief town, Francistown.

Tatius, Aohilles, an Alexandrian writer of romances, probably lived in the 5th century A.D. His *Leucippe and Cleitophon* is written in elegant Greek but has a rather improbable plot; the characterisation is weak. It is printed in the *Erotici Scriptores Græci*, and there is an English translation by the Rev. R. Smith, 1855.

Tatra-Füred, or Alt-Schmöcks, a watering-place in the co. of Szepes, Hungary, 125 m. N.N.E. of Budapest.

Tatra Mountains, see **CARPATHIANS**.
Tatta, a tn. of Sindh, India, on the Indus, 54 m. E.S.E. of Karachi, once a town of importance. Pop. 10,000.

Tattersall, Richard (1724-95), born at Hurstwood in Lancashire, but came from there at an early age to London, where he entered the service of the Duke of Kingston. He afterwards became an auctioneer, and established himself at first at Hyde Park Corner. Here he built up a great business as an auctioneer of high-class horses, and finally his place became a recognised racing centre. In 1865 the premises were transferred to Knightsbridge.

Tattersall's, the name given to the establishment for the auction of horses, at present at Knightsbridge Green, whence it was transferred from Hyde Park Corner in 1865. It was founded by Richard Tattersall (q.v.).

Tattooing, the name usually given to the custom common among many uncivilised tribes of marking the skin by punctures or incisions, and introducing into them coloured fluids, so as to produce an indelible stain. T. has been found in most of the islands of the Pacific Ocean, and among many of the aboriginal tribes of Africa and America, as well as, on a limited scale, in the East. The native chiefs of New Zealand tattoo the face and the whole body in a variety of very elaborate symmetrical figures. It is done by puncturing the skin with sharp-pointed instruments till the blood flows, and then rubbing in charcoal. The marks which result are permanent, and appear black on a brown skin, while on the skin of a European they appear blue. The age for tattooing the males varies from eight or ten years up to about twenty; the females have only the face slightly tattooed. The Bedouin Arabs, the Tangués, and other eastern tribes, and many tribes of American Indians, still practise it. It prevailed amongst the ancient Thracians, and was distinctive of high rank. The ancient Britons also practised it, and traces of it lingered in England until after the Norman Conquest. Perhaps the practice of sailors and soldiers to print anchors and other marks on their arms is a relic of it still subsisting.

Taubate, a tn. in the state of São Paulo, Brazil, 78 m. E.N.E. of São Paulo. Pop. (dist.) 15,000.

Taubmann, Friedrich (1565-1613), a German philosopher and poet, a native of Franconia. He published editions of Virgil and Plautus; *Disseratio de Lingua Latina*; *Melodæstia*; and *Schediasmata Poetica*. His writings were published in *Taubmanniana*, 1707. He was for a

time professor at Wittenberg University, being appointed in 1595.

Tauchba, a tn. in Saxony, 5½ m. E.N.E. of Leipzig. Pop. 5379.

Tauchnitz, Karl Christoph Traugott (1761-1836), born near Grimma, Saxony; established a printing business in Leipzig in 1796 and a publishing house in 1798. His special publications were stereotyped editions of the Greek and Roman classics, but he also printed Bibles and dictionaries. His son, *Karl Christian Philipp Tauchnitz* (1798-1884), carried on the business, and left money for philanthropic purposes. His nephew, *Christian Bernhard, Freiherr von Tauchnitz* (1816-95), also founded in 1837 a printing and publishing house in Leipzig, and began his Library of British and American Authors in 1841. In 1868 he began the collection of German Authors, and in 1886 the Student's Tauchnitz editions appeared. He was ennobled in 1860, and made a Saxon life-peer in 1877. He was British consul-general for the kingdom and duchies of Saxony (1866-95).

Tauern Alps, see **TYROL, ALPS OF**.

Tauler, Johann (1290-1361), a German mystic, born in Strassburg. His *Sermons*, which are marked by sincere practical piety, were printed at Leipzig in 1498, but there is also a modern edition by Julius Hamberger, 1864, and R. H. Hutton published T.'s sermons for festivals under the title of *The Inner Way*.

Tau-ngu, a tn. and cantonment in the district of the same name, Lower Burma, about 75 m. N.E. of Prome. Pop. about 17,000.

Taunton: 1. A municipal and par. bor. of Somerset, England, 30 m. N.E. of Exeter. It has a magnificent 15th century church, a hospital, which was originally a lazaret house, of the 12th to 13th century, and the remains of a Norman castle which was built on the site of an old Saxon fort. The grammar school dates its foundation back to the 16th century. The chief products of the town are apples, cider, gloves, collars, and agricultural implements. Historically the town has played an important part in many ways. It was occupied by the pretender Perkin Warbeck in 1497. During the Civil War it was held for Parliament, and later in the same century it witnessed the proclamation of the Protestant 'King' Monmouth and the brutalities of Jeffreys and Kirke's 'lamb.' Pop. (1911) 22,563. 2. A city of Massachusetts, in Bristol co., of which it is the co. seat. It manufactures cotton goods and some machinery. It is about 30 m. from Boston. Pop. (1910) 34,259.

Taurus Mountains, a range of mountains which stretches well over 50 m. in a north-easterly direction from the confluence of the Rhine and the Main. It is extremely well wooded and the lower slopes are particularly fertile. The vineyards which are situated there are of world-wide reputation and produce such famous wines as Rudesheimer and Hochheimer. The chief mountain heights are Grosser Feldberg (2890 ft.) and Kleiner Feldberg (2715 ft.). On this range of mountains are situated some famous German spas, such as Homberg, Wiesbaden, and Ems, all of which are famous for their mineral springs. A national monument representing the figure Germania was here erected in commemoration of the war of 1870-71.

Taupo, a lake of North Is., New Zealand, situated in the centre of the island. The chief river flowing into it is the Waikato, while near its shores are volcanoes.

Tauranga, a tn. and harbour of North Is., New Zealand, on the Bay of Plenty. Pop. 1000.

Taurica Chersonesus, or **Tauric Chersonese**, also called the **Tauric Peninsula**, was an ancient name for the Crimea (q.v.).

Taurida, a gov. of Russia, having for its boundaries the Black Sea and the Sea of Azov. It includes the peninsula of the Crimea—where the scenery is mountainous and picturesque. Cereals are among the chief products, while the manufactures include flour and tobacco. Area 23,312 sq. m. Pop. 1,876,200.

Taurine ($C_2H_7NSO_3$), amidoethylsulphonic acid, a crystalline substance produced in the decomposition of bile.

Tauromenium, see **TAORMINA**.

Taurus, a range of mountains in the S. of Asia Minor extending from the R. Euphrates to the Aegean Sea. Portions of the range are known by different names, as Ala-Dagh, Bulgar-Dagh—the height ranging from 8000 to over 10,000 ft.

Taurus, or the **Bull** (symbol γ), the second sign of the zodiac, which used to be the first of the year. It contains the beautiful star Aldebaran, and the groups Hyades and Pleiades, the last named being involved in nebula. Other nebulae are the 'Crab,' discovered in 1731, and N.G.O. 1554 and 1555, both variable. ζ Tauri is a spectroscopic binary, period 138 days, the spectrum showing helium; R and S are Mira variables; λ has a dark companion, the period of eclipse being 3.9 days. Boss has studied a globular cluster, 140 light years distant, and shown their common motion (see **STARS**, diagram).

Taus, a tn. of Bohemia, Austria, 27 m. S.W. of Pilsen. It is a manufacturing town. Pop. 8170.

Tautog, or **Black Fish** (*Tautoga onitis*), a food fish which occurs off the Atlantic coast of N. America. It averages from 12 to 14 lbs. and is much valued in American fish markets.

Tavastehus, the cap. of the gov. of T., Finland, 60 m. N.N.W. of Helsingfors. Its castle, dating from the middle ages, is used as a prison. Pop. 5000.

Tavern, see **LICENCES AND LICENSING LAW**.

Tavernier, Jean Baptiste, Baron D'Aubonne (1605-89), a famous French traveller of the 17th century, born at Paris of Protestant parents, and commenced his career as a traveller in 1631, when he travelled to Turkey and Persia. During the succeeding years he travelled much in the East, visiting many places in Persia, Syria, and India. Finally he travelled through Batavia, and returned via the Cape. He published his famous *Six Voyages* in 1676, and a book dealing with his life and adventures was published in 1886 by Foret.

Taveta, a district of British E. Africa, near to Mount Kilimanjaro, possessing an extremely rich vegetation.

Tavira, a seaport tn. of Algarve, Portugal, 20 m. N.E. of Faro. It trades chiefly in mineral waters and wines, and is also engaged in fishing. Pop. 12,000.

Tavistock, a tn. of Devonshire, England, 15 m. N. of Plymouth, on the R. Tavy. It has many fine buildings, chief amongst which are the parish church and the guildhall. There are also the remains of a fine abbey which was granted to the Russell family at the time of the Dissolution by Henry VIII. Part of this abbey now constitutes a public library. The chief industries are copper-mining and the extraction of arsenic.

Tavoy, a seaport, the cap. of T. district, Tenasserim, Lower Burma, 30 m. from the mouth of the Tavy River. It is in a rice-producing region. Pop. 22,400.

Taw, a river of Devonshire, England, rising on Dartmoor, and flowing into Bideford Bay. Length 50 m.

Taxation is that branch of political economy which endeavours to explain the mode in which the revenue required for the public service may be most advantageously raised.

General principles of taxation.—The majority of economists of the last century set out by an enumeration of the four classic canons or maxims of Adam Smith. They are,

briefly stated, as, follows: 1. The subjects of a State ought to contribute towards the support of the Government as nearly as possible in proportion to their respective abilities. 2. Taxes should be certain, not arbitrary. 3. Taxes should be levied at the time at which it is most convenient for the contributor to pay them. 4. A tax ought to be so contributed as both to take out and keep out of the pockets of the people as little as possible over and above what it brings into the public treasury of the State. It is obvious that no Government with any regard to the cost of collection could possibly undertake to secure such an equality for each individual as distinct from each class of individuals, and the most that can be done is to take classes in the aggregate, determine what kind of tax presses least hardly on the different classes, and, in the case of imposts laid on all, to lessen the burden by graduation, abatement, proportionate percentage, or some other means of equitable adjustment. In spite of Mill's criticisms, the opinion that a tax in the shape of a given fraction of a small income is a heavier burden than the same fraction deducted from a much larger income, Mr. Gladstone adopted the principle of abatement, and in renewing the income tax in 1860 exempted all incomes below £100 and taxed higher incomes on the excess above £60. (Bentham first advanced the principle of leaving a certain minimum of income sufficient to provide the necessities of life untouched.) (For the present system of exemption and graduation, the differentiation of rates in the case of unearned income, and the imposition of super-tax, see under INCOME TAX.) Mill allowed that some taxes which violated the maxim of equality might none the less be justifiably imposed, and Mr. Lloyd George's Increment value duty has at least the respectable weight of Mill's opinion that the increase of the rent of land from natural causes is a fit subject of peculiar taxation (see INCREMENT and LAND TAXES). The present tax on undeveloped land, of course, violates the rule sometimes put forward (e.g. by Ricardo as an objection to legacy duties) that taxes should fall on income and never on capital—a rule to which Mill himself attached not the slightest importance, seeing that all taxes were in some sense partly paid out of capital, and that in a country where wealth was abundant such taxes did not sensibly impede the increase of national wealth.

The second of Smith's maxims is in effect violated by the imposition of

ad valorem duties on certain imported commodities instead of duties of a fixed money value (Faweett, *Political Economy*). Fixed duties, too, are more in keeping with free trade principles, especially as those imposed on commodities, the quantity and price of which vary according to climatic or other conditions, must necessarily tend to discourage production. Adam Smith's third maxim is commonly assumed to be observed in the ordinary course of commercial dealing thus: The wholesale merchant pays the duty in the first place if the commodity be a dutiable import, or the retailer pays for foreign goods by means of negotiable instruments to cover both the wholesale price and the duty, the amount of the tax being ultimately borne by the consumer. But in point of fact the consumer's convenience is not directly considered by the Legislature; he must, if he does not choose to dispense with any particular dutiable article, pay the market price for it and console himself with the reflection that in theory the majority of the electorate is in favour of the tax. Most economists in the past and many latter-day economists confidently assert that taxes on rent and taxes on real profits cannot be transferred. No doubt the occupier of land can, if he pays the property tax, deduct it from his rent, but it is a moot point whether land taxes (whatever may be their immediate operation) in almost any shape or form do not, in a country where land is limited, result in increased rentals. The vehement anger stirred up in some quarters by Mr. Lloyd George's *undeveloped land duty* may have been due to the fact (if so) that here at last was an impost which could not be shifted even on to the purchaser in the open market into whose hands the duty operated to throw many an estate. Taxes on raw material transgress Adam Smith's fourth rule, for they add to the cost of production in the first stage of the industrial process, and by increasing the capital needed for supplying the commodity in question, accumulate a charge on the consumer. Hence the utility of bonding houses, wherein goods may remain until actually sold, and the payment of duty postponed till that time, the result being that the consumer avoids payment of the interest on the duty as well as on the original cost of the goods. The T. of raw material has, ever since the repeal of the Corn Laws, met with the almost unanimous reprobation of economists, even those of the protectionist school. But it has required all the ingenuity of the

Conservative press of to-day and the strenuous assertions of the pamphleteer to assure the electorate that the protagonists of Tariff Reform (*q.v.*) have no intention (if that be so) of taxing raw material (including in that term food required for the maintenance of productive labour). Finally, in connection with Adam Smith's fourth rule it is to be added that the cost of collecting taxes should be as low as possible, as a corollary of which it follows that the articles chosen for taxation should be such that the cost of collection is not out of all proportion to the revenue yielded by the tax.

Direct and indirect taxation.—Adopting the orthodox point of view, a tax is said to be *direct* when it is imposed on the incomes or property of individuals; *indirect* when it is imposed on the articles on which such incomes or property are expended. Mill expresses the distinction as follows: 'A direct tax is one which is demanded from the very persons who it is intended or desired should pay it. Indirect are those which are demanded from one person in the expectation and intention that he shall indemnify himself at the expense of another, such as excise or customs.' It is difficult to say who really bears the burden of a tax on rent, though all such taxes are commonly assumed to fall upon the landlord. (See also under **PUBLIC REVENUE**.) The current division into direct and indirect taxes, for what it is worth, places in the first category taxes on rents, profits and wages; certain stamp duties, such as those on Insurance, bills, notes and drafts (all of which are taxes on income generally); stamps on deeds, on probates of wills, on legacies and successions, together with all *assessed taxes*, such as carriage licence duties and dog tax (all of which are taxes derived from property). Excise and customs duties are the only taxes commonly included in the second category. Poor rate, in so far as levied on land, is borne by the landowners; in so far as levied on trade premises, it is borne by the consumers of the articles manufactured on such premises. Each system of T. has had powerful advocates. A large revenue is easily collected under a system of indirect T., and, when the tax hits only a few commodities, all of which are widely consumed, the machinery of collection is simple and inexpensive; again, an indirect tax takes as little as possible out of the pockets of the people over and above what it yields in the shape of public revenue. Conversely, direct taxes on articles of

luxury involve expense in collection. But, on the other hand, direct taxes, especially if limited to profits on capital and upon *all* kinds of capital, are perfectly just. The modern tendency is to transfer burdens from indirect to direct taxation, a tendency which up to 1880 was the natural development of British finance. Mr. Lloyd George's highly controversial Budget of 1909-10 revived it. It selected for taxation only tobacco, and burdens on unearned and large incomes, upon monopolies in the form of licences, and upon the larger landed estates. In 1840 the proportion of indirect to direct T. was as 73 to 27; in 1870 61 to 39, in 1880 50 to 40, in 1895 52 to 48, and in 1906 the proportion was equal. Related to the incidence of T. is one of the most insistently repeated arguments in favour of protection, namely, that the cost of protection is not borne by the consumer. The merits of the fiscal controversy cannot appropriately be even touched upon in this article (see **FREE TRADE, MERCANTILE SYSTEM, PROTECTION, TARIFF REFORM**, and also **CUSTOMS DUTIES**). See also **IMPORTS** and **EXPORTS**.

Taxation of Costs, see **COSTS**.

Taxation of Land Values, see **LAND TAXES**.

Taxidermy, the art of preparing the skins of vertebrate animals so as to reproduce their lifelike appearance and characteristics as nearly as possible. The art began to be practised in the 16th century, and the Sloane collection, which formed the nucleus of the natural history collection at South Kensington, was made in the early 18th century. Skinning must be done with great care, as if the skin is flayed off there is great difficulty in restoring its proper proportions. A bird is opened under the wing. If opened on the breast, the bowels may be cut into, and a white breast spoiled. After the body is removed measurements are taken. While the skin is inside out it is painted with a preservative soap; Mr. Montagu Browne recommends the following: Whiting or chalk, $1\frac{1}{2}$ lb.; white Windsor soap, $\frac{1}{2}$ lb.; chloride of lime, $\frac{1}{2}$ oz.; and tincture of musk, or eucalyptus oil, $\frac{1}{2}$ oz. In making a skin, the head is filled with tow before being turned through the neck, and with this material a false body is then constructed by wrapping the tow round a piece of wire. This is put into the skin, and while drying any irregularity is corrected. 'Settling up' may be done by wiring

and filling in with cotton wool or tow. This is known as the 'soft-body' method. The 'hard-body' method is that of using a carved-out body of cork. A more modern method is to retain the skeleton, and after freeing it from flesh and washing it with carbolic acid, to work over it with tow or clay to produce a shape like that of the body. Another method, with larger birds and most mammals, is to prepare a mould of plaster by arranging the hardened carcase in a suitable attitude. When the mould is dry paper casts are made by pressing a series of layers of paper into the mould, so that when the model is properly mounted and prepared the skin can be drawn over it. After setting up the specimen is painted over with a solution of 50 grains of bichloride of mercury in a pint of methylated spirits of wine, as a protection against the ravages of insects. With the exception of grasses, mosses, and dried leaves, real natural objects should be excluded from the 'mounting,' as they are almost certain to harbour insects. The highest art of the taxidermist falls with fishes, for shrinking and shrivelling of the skin cannot be avoided. A more satisfactory method is to take a cast as soon as possible after capture, and make an exact model in plaster. See Montagu Browne, *Practical Taxidermy*.

Taxing Master, see **COSTS**.

Taxodium, a genus of deciduous coniferous trees. *T. distichum*, the deciduous cypress, is a tall tree often grown in Britain, bearing cones about the size of a walnut; the trunk is usually very thick and the base is often swollen, while knees or hollow protuberances rise from the roots when the tree grows in swampy soil. The timber is of considerable value. Other species include *T. heterophyllum*, the Chinese water pine, and *T. mucronatum*.

Taxus, see **YEW**.

Tay, a riv. and firth of Scotland. It rises on the borders of Argyllshire in the Grampians, and flows first of all in a N.E. direction and then at the confluence of the Tummel in a S.E. direction. It flows through Perthshire and its estuary forms the division between the counties of Forfar and Fife. Its chief tributaries are the Tummel, the Bran, the Almond, and the Earn. The Earn only joins it at its estuary. The total length of the river, including the firth, is 115 m. It is crossed at Dundee by the famous T. Bridge. The chief port is Dundee, but shoals prevent navigation to this port being very good. The river, however, is navigable as far as the town

of Perth. The total area of the T. basin is nearly 2500 sq. m. It is famous as a salmon river, the annual value of the salmon caught being about £50,000.

Tayabas: 1. A prov. of Luzon Is., Philippines, forming an isthmus between the two parts of the island. Grain is the chief product. Cap. Lucena. Pop. 153,000. 2. A tn. of the prov. of Tayabas, 63 m. S.E. of Manila. Pop. 14,740.

Tay Loch, one of the lochs which are found in the course of the R. Tay. It is situated in Perthshire not very far from the source of the river and before the river joins the Tummel. Other lochs in the course of the same river are lochs Dochart, Lydoch, and Rannoch.

Taylor: 1. A bor. of Lackawanna co., Pennsylvania, U.S.A., 3½ m. S.W. of Scranton, engaged in the manufacture of silk and in coal-mining. Pop. (1910) 9060. 2. A city of Williamson co., Texas, U.S.A., 35 m. N.E. of Austin. Chief products are cotton and dairy produce. Pop. (1910) 5314.

Taylor, Alfred Swaine, M.D., F.R.S. (1806-80), a medical jurist, born at Northfleet, Kent. He was a student at Guy's and St. Thomas's, and, having spent some time in travel, was appointed professor of medical jurisprudence at Guy's in 1832, a post he held until 1870. His works include: *A Manual of Medical Jurisprudence*, 1844; *The Principles and Practice of Medical Jurisprudence*, 1865; *Poisons in Relation to Medical Jurisprudence and Medicine*, 1848.

Taylor, Bayard (1825-78), an American author, born in Pennsylvania. He was apprenticed to a printer, but in 1844 set sail for Liverpool and spent the next two years in travel, the result of which appeared in his *Views of Foot, or Europe seen with Knapsack and Staff*, 1846. He went to Mexico, and published a book of travels entitled *El Dorado, or Adventures in the Path of Empire*, 1850. He next visited Egypt, Asia Minor, India, Hong-Kong, China, and Japan, and recorded his journeys in *A Journey to Central Africa*, 1854; *The Land of the Saracens*, 1854; and *A Visit to India, China, and Japan*, 1855. His narrative poem, *Lars*, and *Northern Travel* appeared as a result of a visit to Sweden, Denmark, and Lapland, but his reputation as a poet rests upon his translation of Goethe's *Faust*, one of the finest attempts of its kind. Taylor also wrote novels, e.g. *Hannah Thurston*, 1863, and critical essays, notably *Studies in German Literature*, 1879.

Taylor, Brook (1685-1731), an English mathematician, born at Edmon-

ton, Middlesex. T. entered St. John's College, Cambridge, in 1701, and took degree of LL.B. in 1709. He became a fellow of the Royal Society in 1712, and its secretary in 1714, and the same year took his degree of LL.D. In 1716 he went to Paris, and had an enthusiastic reception from the French savants. He returned to England in 1717, and resumed his study, but was forced by declining health to resign his secretaryship in 1718. T. contributed able papers on higher algebra, dynamics, and general physics. His *Methodus Incrementorum* was published in 1715, and a *Treatise on Linear Perspective* in 1719.

Taylor, Sir Henry (1800-86), an English dramatist. He was a contributor to the *Quarterly Review* when he was twenty. In 1824 he, through the influence of Mr. Henry Holland, was appointed to the Colonial Office. He devoted his leisure to writing, and in 1828 produced a tragedy, *Isaac Commenus*, which was a failure. This was followed by *Philip van Artevelde* (1834), which was a great success. In recognition of his official labours, T. was in 1869 created K.C.M.G. His *Autobiography*, privately printed in 1877, was published in 1885.

Taylor, Isaac (1759-1829) an English engraver and author, the son of Isaac T. (1730-1807). Having been brought up in his father's studio, he engraved plates for *Boydell's Bible* and 'Shakespeare,' as well as the 'Assassination of Rizzio' after Opie, and a set of designs for Thomson's *Seasons*, etc. He published *Spectimens of Gothic Ornaments selected from the Parish Church of Lavenham*, 1796, and a series of children's manuals.

Taylor, Isaac (1829-1901), an English philologist, born at Stamford Rivers, and was the son of Isaac T. (1785-1865). His chief work was *The Alphabet, an Account of the Origin and Development of Letters* (new ed., 1899), but he also published *Greeks and Goths: a Study on the Runes; Etrus*

Family Pen; and *Leaves from a book*. He was canon of York, and two years later dean.

Taylor, Jane (1783-1824), an English writer for children, was the daughter of Isaac T. (1759-1829). She published with her sister Ann (1782-1866) *Original Poems for Infant Minds; Rhymes for the Nursery;* and *Hymns for Infant Minds;* and separately, *Contributions of Q.Q.* and *Display, a Tale for Young People*. She was much admired by Browning and Sir Walter Scott.

Taylor, Jeremy (1613-1667), a divine, was educated at Cambridge University, and took holy orders in 1634. Shortly afterwards, deputising for his friend Riden, divinity lecturer at St. Paul's, his sermons attracted the attention of Laud, who interested himself in the young man, and sent him to Oxford, where he was elected to a fellowship at All Souls in 1636. He became chaplain to Laud and shortly after was appointed one of the King's chaplains. There were rumours that he might go over to Rome, but his famous 'gunpowder treason' sermon (1638) disposed of them for good and all. In 1643 he was made rector of Overstone, and two years later was taken prisoner by the Parliamentary forces at Cardigan Castle. He settled at Gordon Grove, Carmarthenshire, and wrote his well-known works, *The Liberty of Prophecy* (1646), *Holy Living* (1650), and *Holy Dying* (1651). After the Restoration he was appointed Bishop of Down and Connor, and was also made 'administrator' of the diocese of Dromore; but his desire for an English bishopric was never gratified, though his claims for such preferment were incontestable. He was one of the most literary of churchmen, and his books are still regarded as among the masterpieces of theological literature, *Holy Living* and *Holy Dying*, in particular, having run through many editions. His works were first collected in fifteen volumes in 1822 by Reginald Heber, and there has been a later edition by Eden (1847-1852). The *Poems and Verse Translations* were edited by Dr. Grosart (1870). There is a biography by Heber (1822).

Taylor, John (1580-1653), commonly called the 'Water-Poet,' was born at Gloucester. He achieved notoriety by a number of eccentric journeys, notably the voyage from London to Queenborough in a paper boat, described in *The Prose of Hempseed*, and the journey from His

Society, 1868-78.

Taylor, John (1704-66), an English classical scholar, born at Shrewsbury. He took orders and was made canon of St. Paul's in 1757. He published editions of Greek authors with notes on Attic law; *Marmor Sapidense*, a commentary on the inscription on an ancient marble; and *Elements of Civil Law*.

Taylor, John James (1797-1869), an English Unitarian divine, born at Newington Butts, Surrey. He was made professor of ecclesiastical history at Manchester New College in

1840, and professor of theology in 1852. In the next year he was made principal of the London College. His publications are numerous.

Taylor, Nathaniel William (1786-1858), an American Congregational minister, born at New Milford, Connecticut. Having graduated at Yale, he became, in 1812, pastor of the First Church of New Haven, and in 1822 professor of theology at Yale. His 'New Haven theology,' long regarded as heretical, maintained the doctrine of natural ability and denied total depravity. His works were edited and published by Noah Porter, 1858-59.

Taylor, Peter Alfred (1819-91), an English Radical politician, born in London. A silk mercer, he first became known in public life as a friend of Mazzini and of the Young Italy party, but he entered Parliament in 1862 as member for Leicester. He represented the Manchester school, and was also one of the pioneers of international arbitration.

Taylor, Philip Meadows (1808-76), an administrator and novelist, born at Liverpool. Being sent to Bombay he accepted a post in the service of the Nizam, and after the Mutiny was appointed by the British Government in charge of some of the ceded districts of the Deccan. He was the author of brilliant novels describing Indian life and history, notably: *Confessions of a Thug*; *Tippoo Sultan*; *Tara*; *Ralph Darnell*; *Seela*; and *A Noble Queen*; but he also wrote *The Story of My Life* and a *Student's Manual of the History of India*.

Taylor, Sir Robert (1714-88), an English architect and sculptor, was the son of a stonemason. The monuments to Cornwall and Guest at Westminster Abbey and the figure of Britannia in the centre of the principal façade of the old Bank of England are his work, but in his later years he abandoned sculpture for architecture. He built many country houses, and Stone Buildings, Lincoln's Inn, and in 1776-81 and again in 1783 he was appointed architect to the Bank of England, and made additions to that building.

Taylor, Rowland (d. 1555), an English Protestant martyr, born at Rothbury, Northumberland. He became chaplain to Cranmer in 1540, and incumbent of Hadeleigh, Suffolk, in 1544, becoming archdeacon of Exeter in 1552. He was one of the first to suffer martyrdom in Mary's reign, and was celebrated as the ideal of a Protestant parish priest.

Taylor, Silas, *alias* Domville (1624-78), an English antiquary, born at Harley, Shropshire. He served in the Parliamentary army as captain, and

later, in 1660, acted in the capacity of commissary for ammunition under Sir Edward Harley at Dunkirk. He published *The History of Garthkind*, 1663.

Taylor, Thomas (1758-1835), an English writer, generally called 'the Platonist,' born in London. He published translations of the Orphic hymns, Plato, Aristotle, Proclus, Porphyry, Apuleius, Pausanias, etc.

Taylor, Tom (1817-1880), an English dramatist, born at Bishop Wearmouth. He was called to the bar but devoted himself principally to journalism, contributing to numerous papers, including *Punch*, of which he was editor in succession to Shirley Brooks from 1874 until his death. Among his books was a work on *Leicester Square* (1874), but he is best remembered as the author of a poor play, *Our American Cousins* (1858), in which Sothorn made a great success in England and America.

Taylor, Walter Ross (1838-1907), a Scottish ecclesiastic, born at Thurso. He was minister of the Free Church at E. Kilbride in 1862, being translated to Kelvinside Free Church, Glasgow, in 1868. He played a leading part in denominational affairs, and constituted the first General Assembly of the United Free Church.

Taylor, William (1765-1836), an English man of letters, born in Norwich. Having met Goethe he became an enthusiast for German literature and translated Bürger's *Lenore*, Lessing's *Nathan*, Goethe's *Iphigenia*, and four of Wieland's *Dialogues of the Gods*, but his great work was his *Historic Survey of German Poetry*, 1828-30.

Taylor, Zachary (1784-1850), the twelfth president of the United States, born in Orange co., Virginia. He entered the army in 1808, and in 1812 was placed in command of Fort Harrison on the Wabash, which he successfully defended against the Indians. In 1832 he fought in the Black Hawk War, and in 1836 went to Florida and defeated the Seminoles at Okeechobee Swamp. After the annexation of Texas he resisted the Mexican invasion, winning the battles of Palo Alto and Resaca de la Palma and seizing Matamoros and Monterey, and later gained the memorable victory over Santa Anna at Buena Vista in 1847. On his return he was nominated for the presidency by the Whigs (1848) and elected, just at the time when the struggle over the extension of slavery had begun, and various other party questions were rife, but he died during the Compromise of 1850.

Taylorville, the cap. of Christian co., Illinois, U.S.A., 26 m. S.E. of

Springfield. Chief manufs. paper and chemicals. Pop. (1910) 5446.

Tayport, or Ferry-Port-on-Craig, a tn. in the co. of Fife, Scotland, on the shore of the Firth of Tay, $3\frac{1}{2}$ m. E.S.E. of Dundee. Pop. (1911) 3273.

Tayug, or Tayud, a puehlo in Pangasinan prov., Luzon, Philippine Is. Pop. 11,000.

Tchad, Tchernigov, Tchira, Tchelyuskin; and Tchelyabinsk, *see* CHAD, CHERNIGOV, CHIRA, CHELYUSKIN, and CHELYABINSK.

Tchaikovsky, Peter Ilich, *see* TSCHAIKOVSKY.

Tchebichev, Pafnuti Luovitch (1821-94), a Russian mathematician. He was born at Borovsk, in the prov. of Kaluga, and occupied the chair of mathematics in the University of St. Petersburg from 1859 to 1880. He invented various mathematical instruments, including a link-work machine for producing straight-line motion.

Tcherkask, a dist. in the territory of the Don Cossacks. The cap. is Novo-Tcherkask, about 910 m. S.S.E. of St. Petersburg.

Tcherkesses, *see* CIRCASSIA.

Tchernaiiev, Mikhail Gregorjovich (1828-98), a Russian general. He became prominent first in the Crimean War. In 1865 he reduced Tashkend. He retired in 1874, and for some time edited the Russian journal *Ruski Mir*. He took over the command of the Servian army, but in 1879 he was involved in political difficulties and sent back to Russia. For some years (1882-84) he was governor of Turkestan.

Tchernavoda, a tn. of the Dobrudja, Roumania, on the Danube, 32 m. W.N.W. of Kustendje.

Tchernigov, the cap. of the gov. of Tchernigov, Russia, on the Desna. Pop. 27,000.

Tchernyshevsky, Nikolai Gavrilovich (1828-89), a Russian author, born at Saratov. He was arrested in 1862 as a propagator of Nihilism and condemned to exile in Siberia in 1864. His novel, *What's to be Done?* was written in prison, other works from his pen being the translation into Russian of Adam Smith's *Wealth of Nations* and Weber's *History of the World*.

Tchikhatchev, Peter Alexandrovitch (1812-90), a Russian geographer and geologist. He was born at Gatchina, prov. of St. Petersburg, and became an attaché to the Russian embassy in Constantinople in 1842. While holding that position he made several journeys through the Turkish dominions, and recorded his observations in a series of geographical and geological books.

Tchirpan, a tn. in Eastern Rumelia,

Bulgaria, 30 m. E.N.E. of Philippopolis. Pop. 12,000.

Tea, a beverage used since a remote period in China, but unknown in England until 1645, when it was introduced by the Dutch. Though it at once attracted great interest, it was only obtainable by wealthy people until about 1750. At first it was infused and kept in barrels, being drawn like beer, and warmed for use. In 1660 a tax of 1s. 6d. was imposed per gallon of liquid tea, but in 1680 a tax of 5s. per lb. was substituted. Since 1852, when the tax was 2s. 2½d. per lb., it has been down to 4d. in 1890, and is now (1913) 5d. The consumption in Britain is about 300,000,000 lbs. per annum; of this about two-thirds is Indian T. The first shipment of Indian T. was made from Assam in 1836. T. is derived from *Thea sinensis*, which grows wild in Assam, and was probably introduced from there by the Chinese. The young leaves and shoots, or 'flushes,' are picked from the bushes by women and children. After gathering, they are spread thinly over wire or bamboo trays, and placed in a large house in a temperature of about 80° for two days to wither, when they can be rolled without breaking. This process causes the juice to be exuded, and it is still performed manually in China, though large and hygienic rolling machines have been introduced. The leaf is then spread out thinly on the floor of a fermenting room, where the air is kept moist, and there in a few hours it changes from a green to a copper colour. It is then 'fired' by being spread out on trays and carried through a hot-air chamber. After being sorted or classified, a process carried on in modern plantations by machinery, the T. is again 'fired' and then packed for export. In making T. the water should be fresh and freshly boiled, and after pouring over the T., should be allowed to stand for three to five minutes, when the T. should be poured off the leaves. Ts. costing up to 1s. 8d. per lb. should make about 220 cups to the lb., while more expensive Ts. make about 280 cups. There are many other methods of using T., and a gargle of T. is strongly recommended for sore throat.

Teachers' Guild, an association of teachers in all branches of the educational profession in the British empire. Its aim is to promote the interests of the profession as a whole without regard to grading distinctions. Among its activities is the promotion of holiday courses for British teachers at various continental centres.

Tears, the secretion of the lachrymal gland. *See* EYE.

Technical Education, a system of instruction whose aim is directly utilitarian, especially in relation to productive industries. In the wider sense of the term, any branch of knowledge which is a necessary preliminary to any particular profession or trade is technical, such as the instruction received by medical students, law in connection with the legal profession, the principles of art as studied by artists with a view to their application, etc. For administrative purposes, however, the term is practically restricted to instruction which is calculated to render workmen, foremen, managers, clerks, and others more competent in fulfilling duties in their particular industries. Formerly, technical instruction was received in the course of apprenticeship; the young workman was directly under the eye of his master, and was taught the details of his trade during actual working hours. Many causes have combined to break up the old institution of apprenticeship, among which may be mentioned the specialisation which has divided many industries into small branches, rendering acquaintance with the industry as a whole difficult to achieve by a person actually engaged in the work, and the modern tendency to 'efficiency' in organisation which makes it difficult to find a place for a person who is at once pupil and workman. It is accordingly found a more useful plan to instruct the would-be worker in the principles underlying his work before he begins to practise them, or, in the case of actual workers anxious to improve their position, to provide for instruction in the evenings after work is over. The growing complexity of many industries demands that efficient technical instruction should be provided so as to commence at a fairly early age, and there is a tendency for the claims of technical education to contend with those of general education to the detriment of the latter. There is consequently a wide-spread desire to force into the school curriculum subjects which are calculated to prepare the pupil in a practical manner for his life-work as artisan. Fortunately, the administrations of most modern countries have decided that up to the age of about fourteen, the chief aim of all instruction should be a broadening of outlook, the provision of a mental and physical equipment which shall prepare the pupil to play an enlightened part in all the varied activities of life. After the age of fourteen, it is very generally conceded that instruction may be specifically technical, or may serve the ends of a higher general education at the option, or according to the

ability, of the pupil. In the provision of technical instruction the following principles are generally observed by modern states. The state itself has a responsibility to modern industry, but the carrying out of details is best left to local administrations. Special schools may be provided for definitely technical purposes, but there is no need to divorce technical from secondary education, if the local conditions are favourable to a combination. The higher branches of technical education, i.e. those that concern the future of an industry rather than the practical needs of the present, should be administered in centralised institutes by the state itself, or by universities or other bodies in direct communication with the state administration. Technical education in general should bear a relationship to local industries. In England, provision was made for technical education by the Technical Instruction Act, 1889, which empowered county and borough councils to levy a rate of not more than a penny in the pound for the support of technical instruction. By the Education Act, 1902, the control of education in general was placed in the hands of county and borough councils. Day technical schools are concerned with the teaching of the principles underlying the arts and crafts, and to a certain extent provide for the cultivation of dexterity in the use of tools, etc. Evening classes are established for supplementary instruction for those already engaged in industry or commerce. The working-class pupil may thus pass from the elementary school into the technical or secondary school by means of scholarships, or may leave school and attend evening classes after his hours of labour. On the continent, however, the differentiation of secondary schools in order to provide various types of professional or trade instruction is carried further than in England, and there is a tendency to make continuation classes compulsory up to the age of seventeen. In America, agricultural and trade colleges are supported by revenue from public lands, while the provision of commercial and trade schools of various types by public and private enterprise is a prominent feature of educational development in most of the states.

Technology (Gk. *τέχνη*, art or craft), the body of knowledge relating to arts and crafts. It includes the history of the development of productive arts, the scientific principles underlying them, and descriptive accounts of processes employed in them.

Teddington, a par. and tn. of Middle-

sex; England, on the l. b. of the Thames, 2½ m. S.W. of Richmond. The National Physical Laboratory (q.v.) is situated in the neighbourhood. The first lock on the Thames is at Teddington. Pop. 16,000.

Tees, a riv. of England, which rises in Cross Fell, Cumberland, and flows S.E. and then N.E. through Teesdale, forming the boundary between York and Durham. After a course of 70 m. it flows into the North Sea. The tributaries are the Langley Beck and Skerne on the right, and the Breta and the Leven on the left. The river is navigable for vessels of 60 tons to Stockton.

Teeth, the calcareous structures occupying the alveolar processes of the upper and lower jaw, and serving to tear, cut, or grind food. The derivation, form, and structure of T. in different animals vary considerably. The cyclostomata are furnished with horny projections by way of T. Fishes generally have well developed T., sometimes arranged in several rows, as in the shark, whose outer T. are replaced by fresh ones from the inner rows as the old ones become worn. The sturgeon has no T. at all, but the pike is provided with a formidable complement, some of the T. being hinged, so that they are directed backwards while prey is being held, resuming a more upright position when disengaged. Amphibians generally are not so well provided with T. as fishes. The frog has none on the lower jaw, and the toad has none at all. Reptiles have usually few T.; in most cases they are fused to the bone of the jaw. Turtles have no T. Non-poisonous snakes are furnished with a few excessively curved T. for retaining their prey. Poisonous snakes have special poison fangs arising from the maxilla; in some cases, as in the rattlesnake, the poison fangs are hinged. Existing birds are without T., but some fossil birds exhibit T. of reptilian form. Mammals are generally well furnished with T. of various forms which are usually classified as incisors, canines, premolars, and molars. In man there are thirty-two permanent T., sixteen in each jaw. They are divided as follows: Two incisors, one canine, two premolars or bicusps, and three molars in each lateral half of each jaw. The incisors have chisel-shaped crowns, and are therefore adapted for dividing food by cutting. In the upper jaw they are socketed in the premaxillary bone. The canine T. are conical in shape, and are therefore adapted for piercing. In carnivorous animals they are pointed T., and are used to pierce prey. The ci

junction of the maxillary and premaxillary bones. The premolars have somewhat flattened crowns and bear two cusps, one external and one internal. The canines are

canines are have a single root. The molars, the largest and firmest T., are placed behind the bicusps. Those of the upper jaw have three or four cusps, while the lower jaw molars have four or five. The upper molars have three roots each, and the lower molars two roots each. The last and smallest molar is known as the 'wisdom tooth.' The arrangement of the T. of any mammalian species is best summed up in a dental formula. Thus the

formula for man, $\frac{2.1.2.3}{2.1.2.3}$, indicates that there are 2 incisors, 1 canine, 2 premolars and 3 molars in each lateral half of the upper and of the lower jaw. The structure of the T. of man is essentially the same in all the forms of T. The outer layer is composed of enamel, a hard substance consisting principally of calcium phosphate and smaller amounts of calcium carbonate, magnesium phosphate, and calcium fluoride. The next layer is composed of dentine which contains the same mineral substances as the enamel with the addition of organic matter. Dentine is hard, though not so hard as enamel; it forms the greater part of the bulk of the tooth, and is furnished with a series of fine channels by which communication is established between its substance, the enamel and the dental pulp. The dental pulp is contained in a cavity within the dentine. It consists of blood vessels and nervous matter. The root of the tooth is devoid of enamel, but possesses a coating of 'dental cement,' a bony layer which is adjacent to the periosteum of the alveolar cavity. The permanent T. in man are preceded by temporary or 'milk' T. These are fewer in number, smaller in size and whiter in colour than the permanent T., and they are also somewhat different in shape, the roots of the molars, in particular, being more divergent than corresponding structures in permanent T. They number two incisors, one canine, and two molars in each lateral half of the upper and lower jaw. They appear usually in the following order: the middle incisors of the lower jaw come between the sixth and ninth month after birth, the incisors of the upper jaw come next, then the remaining lower incisors, then the first molars, then the canines, and last of all the second molars. The whole process is usually over by the end of the second year. The permanent first molar

appears about the seventh year, and is followed by the permanent middle incisors. At eight the remaining incisors appear; then follow the premolars, the canine and the second molar at intervals of about a year between each, the second molar appearing at twelve. The third molar, or wisdom tooth, is not cut until much later, the usual age being twenty. The most common disease affecting the human race is probably dental caries. The cause of the disease is the presence of bacteria in the mouth which bring about fermentative changes in starchy or carbohydrate food by which lactic acid is produced. The acid disintegrates the enamel coating, after which other bacteria cause putrefactive changes in the organic matter of the dentine, leading to a breaklog down of the tooth structure, inflammation of the pulp, and the consequent distressing pain known as toothache. The baneful effects upon general health resulting from defective T. can only be successfully obviated by recourse to the methods of dental surgery. See DENTISTRY; see also C. S. Tomes, *A Manual of Dental Anatomy*, 1904.

Teething (A.-S. *toth*, tooth), the eruption or cutting of the first teeth in infants. Man is provided with two sets of teeth, one of which makes its appearance during infancy and is known as the temporary set or milk-teeth. The eruption of each tooth is preceded by swelling of the gum and increased production of saliva, and accompanied by various irregularities in the health of the child which are generally due, however, to improper feeding. The temporary set consists of twenty teeth. There are on each side four incisors, two canines, and four molars. The middle incisors are cut about the seventh month after birth, the other incisors two months later, the canine at the eighteenth month, and the molars at about the first and second years respectively. Each tooth of the lower jaw appears a short time before the corresponding tooth of the upper jaw. T. is accompanied by restlessness at night. The food should be lessened in strength but not in quantity. See W. B. Drummond, *The Child* (Dont & Sons), and Honnor Morten, *A Complete System of Nursing* (Dent & Sons).

Tegea, an ancient tn. of Arcadia in Greece. In its earliest days it was closely associated with Sparta, but after 371 B.C. became independent. The town was famous for its magnificent temple built in honour of Pallas Athena (394 B.C.).

Tegernsee, a mountain lake of Upper Bavaria, Germany, 27 m. S.E.

of Munich, between the two rivers Inn and Isar. The lake is 4 m. in length and has a width of about 1½ m. It is one of the most popular summer health resorts in Europe.

Tegetthoff, Wilhelm, Baron von (1827-71), an Austrian admiral, born at Marburg in Styria. In 1848 he was present at the blockade of Venice, and commanded the Austrian contingent when the allies were victorious over the Danes at Heligoland in 1864. His most famous victory was that which he obtained on July 4, 1866, over the Italian fleet under Persano, which was bombarding Lissa.

Teggiano (ancient *Tegianum*), a tn. of Campania, Italy, in the prov. of Salerno, 22 m. S.S.W. of Potenza. Pop. 5100.

Tegnér, Elof Kristofer (1844-1900), a grandson of E. Tegnér (q.v.); a Swedish historian. He became in 1883 the chief librarian at Lund. He published in 1872 *Bärug till Kändedom om Sveriges Yltre Politik* which gives a good review of the reign of Gustavus III. In 1887 he completed his biography of Gustaf Mauritz Armfelt.

Tegnér, Esaias (1782-1846), a Swedish poet, born at Kyrkerud in Värmland. He received a good education, and in 1802 became lecturer in philosophy at the University of Lund. In 1811 he published an ode, *Srea*, which was crowned by the Academy. He is regarded as Sweden's greatest poet. He published in 1820 *Nattvardsbarnen*, *Axel* in 1822, and in 1825 *Frithiofs Saga*. He established himself also as a critic of considerable ability. In 1812 he had been ordained, and in 1824 he was made Bishop of Vexjö. His later years were overshadowed by melancholia. See *Collected Works* (1832-85), and Brandes's *E. Tegnér* (1878).

Tegucigalpa: 1. A dept. of the Republic of Honduras, Central America. It is an agricultural dist., and gold and silver mines are worked. Pop. 82,000. 2. The tn. of T. is the cap. of the country, situated on the R. Choluteca. It is a well-built town, containing a cathedral, central university, law courts, national printing works, etc. It is united by a bridge to Concepcion on the opposite bank of the river. Pop. 35,000.

Tehama, the name given by the Arabs to the comparatively low-lying region on the western coast of Arabia.

Teheran, or Tehran, a city and the cap. of Persia. It stands in the centre of an exceedingly fertile plain about 60 m. S. of the Caspian Sea. The climate is exceedingly hot during the summer, but mild and pleasant during the rest of the year. The city is typically eastern, surrounded by pleasant and well-kept gardens. It is

the social centre of the Persian nobles, and not far from here stands the mosque where the Shah Nasr-oddin was assassinated in 1896. The city has little commercial interests, but is the terminus of the Persian railway. In 1911, a concession was granted Russia to build another railway connecting T. to Khanikan, and a Russian railway is also to be constructed going to Batoum and T. Pop. 280,000.

Tehuacan, a tn. of Mexico, in the state of Puebla, and 65 m. S.E. therefrom. It is noted for its mineral springs. Pop. 7700.

Tehuantepec Winds, or Papagayos, as they are known on the Mexican plateau, are due to the same influence as the 'nortes' or 'northerners,' of the regions round the Gulf of Mexico. The comparative warmth of the gulf in winter and the presence of the continental anticyclone over the central portions of N. America produce unstable conditions; in the gulf are generated cyclones which find a path along the coastal regions of U.S.A. between the high pressure over the continent and the Atlantic high pressure at its weakest. The compensating current from the N.E. is composed of cold dry winds from the continent, allied to the mistral or bora of the Mediterranean. They are strong on the Mexican coast, but weaker on the Pacific, in Nicaragua and Guatemala, where they are known as T. W. from their direction.

Tehuelches, a group of Patagonian tribes, about whose strength and stature somewhat exaggerated reports were given by early explorers. Their average height among the males is close on 6 ft., and they have often been spoken of as the tallest race of men.

Teifi, or Teivy, a river of Wales, rising in Llyn Teifi, N.E. Cardiganshire. It forms the boundary between Cardiganshire and Carmarthenshire, and after flowing 53 m. enters Cardigan Bay.

Teign, a river of Devonshire, England, rising in Dnrtnoor, near Chagford; after flowing for 30 m. it enters the English Channel at Teignmouth. Its estuary is nearly a mile across.

Teignmouth, a seaport and market tn. and fashionable resort of Devonshire, England, situated at the mouth of the Teign, 15 m. S.E. of Exeter. Its sea-wall is 2 m. in length. Pipeclay and china clay are shipped here for the other industries, and mulling, and mackerel being taken from the Teign. Pop. (1911) 9221.

Teignmouth, John Shore, Lord (1751-1834), entered the service of

the East India Company as a cadet at the age of eighteen. He rose rapidly in the service of the company, and was finally made a member of the Supreme Council. In 1793 he succeeded Cornwallis as Governor-General of India. He retired from this office in 1797 and received his peerage on his return to this country.

Teil, Le, a vil. and com. of France, in the dept. of Ille-et-Vilaine, 16½ m. S.W. of Vitre. Pop. 5800.

Teinds. The T. of a Scottish par. like the tithes of English law, are that proportion of rents or goods which goes to the maintenance of the clergy. The clergy, however, have now no right to T. beyond a suitable provision or stipend. Generally speaking, T., like tithes, are a burden on land, and most lands, except glebe lands and lands in respect of which the T. have been redeemed, are liable to such burden. According to canon law one-tenth of that which one acquires by one's own industry (*personal T.*) is due by divine right to the Christian clergy; but Scots law requires evidence of forty years' possession of *personal T.* to make good a legal right to them. *Predial T.* are said to be either *parsonage* or *vicarage*; the former being T. of corn due to the parson or other titular of the benefice; the latter being payable to the *vicar* out of cattle, lent, fowl, eggs, etc. *Parsonage T.*, having always been an inherent burden upon all lands not specially exempt, cannot be lost by prescription; but the right to vicarage T., having always rested upon usage, can be lost 'non utendo' (non-user). After the Reformation the whole of the T. were transferred to the Crown, or to private individuals called *titulars* to whom they had been granted by the Crown, or to *feuars* or renters from the Church, or to the original founding patrons, or to colleges or pious institutions. In the reign of Charles I. it was provided by arbitrary decrees (subsequently confirmed by statute) that T. (up till then payable in kind) should be liable to be valued and the landowner entitled to purchase or redeem them at a certain valuation. This obviated the inconvenience of the titular or patron of T. coming on the land at his leisure and claiming the physical separation of his tenth part after harvest (though there was an alternative method of payment by 'rental-bolls'). Landowners liable to T. may also sue titulars for a valuation or for a sale of their T. T. not so valued or redeemed are still 'drawn in kind.' *Predial T.* are still paid in kind. The Court of Session (*q.v.*) has now taken over the whole of the jurisdiction of the old Court of T.

Teith, a river of Perthshire, Scotland, formed by the junction of two streams at Callander, which rise near the N. end of Loch Lomond. The scenery is beautiful and romantic in the upper course, and the castle of Doune stands on its banks. In its lower course the water-power is used to work cotton-mills, etc. It enters the Forth 2 m. N.W. of Stirling.

Tekax, a tn. of Mexico, in the state of Yucatan, 46 m. S.E. by S. of Mérida. Pop. 19,000.

Tekir-dagh, *see* RODOSTO.

Telamon, a character in ancient Grecian legend. He was the brother of Peleus, and together with him slew Phœus their half-brother. T. fled from the country and went to Salamis. He married the daughter of the king of that island and ultimately succeeded to the throne. He was one of the heroes of the voyage of the *Argo*, and took part in the adventure of Hercules when that hero took Troy. He was the father of Ajax.

Telautograph, a telegraphic instrument for the transmission of sketches or written messages; the sketch or message being reproduced identically at the other end of the line. The message is written on a roll of paper by means of a pencil. The motion of the pencil is resolved into its component rotary motions, these motions controlling the currents in two separate circuits. The receiver consists essentially of two very fine coils of copper wire suspended in the field of a very strong electro-magnet. The two line currents sent from the transmitter vary the strength of the field of this electro-magnet, thus causing the coils to have a vertical motion owing to electro-magnetic action. This motion actuates a set of levers which transmit the motion to the pencil on the recorder.

Telav, an old tn. of Transcancasia, Russia, in the gov. of Tiflis, 63 m. N.E. therefrom, on the R. Alazan. It was founded in 893 and possesses numerous interesting ruins of ancient forts, monasteries, etc.; in the near vicinity is the 6th century Ikaltoi monastery, and the neighbourhood is much frequented by pilgrims. There is a considerable export trade in wine. Pop. 12,000.

Telde, a tn. in Gran Canaria, Canary Is., 7 m. S. of Las Palmas, on the E. coast. It has considerable trade. Pop. 9500.

Telegonus, a son of Odysseus by Circe. When he arrived at manhood he was sent by his mother to find Odysseus. He landed on the island of Ithaca, but was attacked by his father and Telemachus, who imagined him a pirate. He slew Odysseus not knowing who he was, and afterwards

conveyed the body to Circe for burial. He married, later, Penelope.

Telephony, *see* HEREDITY.

Telegraph Plant, or *Desmodium gyrans*, an Asiatic leguminous plant, bearing panicles of violet flowers. Its leaflets have a rotatory movement in sunlight. The plant is often grown in the stovehouse.

Telegraphy, a method of transmitting signals to a distant station by means of an electric current. A fairly successful but not very practicable attempt at electric signalling had been made by Morrison, a writer in the *Scots Magazine*. It consisted of a wire for each letter of the alphabet. At the receiving station the letter corresponding to its particular wire would lie on a sheet of paper under the end of the wire. The operator would spell out the words by manipulating the different wires, when the letters at the receiving stations would rise, being attracted by its particular wire, and thus would spell out the word at the receiving station. A somewhat similar system was invented in Geneva about 1774. The discovery of Oersted of the deflection of a magnetic needle out of the meridian by means of an electric current was a great advance. He found that if a wire carrying a current were held over a magnetic needle freely suspended as in Fig. 1, the needle would be deflected

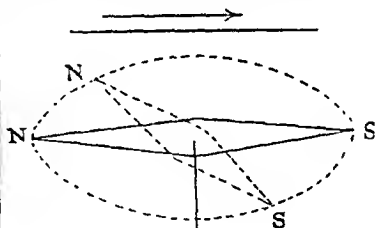


FIG. 1

to the right or left according to the direction of the current. The arrow head shows the direction of the current, the dotted needle showing the needle in its deflected position. Upon this principle many galvanometers used in electric measurements are constructed. From this discovery Wheatstone and Cooke invented in 1835 their five-needle telegraph which required only five wire lines, afterwards inventing the double-needle, and then the single-needle which required only one wire line. The one-needle system is universally used on railways owing to its great sensitiveness, but it has the disadvantage of

being a low-speed system. The invention of the electro-magnet gave Morse most of the requirements for the system which he invented in 1836.

The Morse System.—Fig. 2 represents this system in its simple form. Let C and D be two stations between which communication is made. Both stations are similarly constructed. B and B' represent batteries, one pole of which is earthed at E and E'. R and R' are the recording instruments.

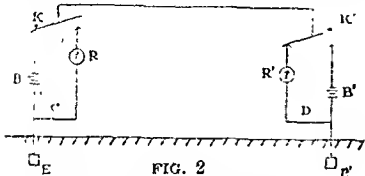


FIG. 2

The keys K and K' are normally in contact with the recording instruments, so that both stations are susceptible to signals. Consider a message being transmitted from C to D. The key K is pressed to make contact with the battery B, then clearly we have a complete circuit, and battery B sends a current through the circuit. The key K affords an instrument for interrupting the current in any approved fashion, and thus the recorder at D takes up the message. During this operation the recorder R is out of the circuit. Similarly a message may be transmitted from D to C by pressing the key K', the key K being now in contact with the recorder R. These keys are actuated by springs, so that unless pressed out of position they are in contact with their respective recorders. The code in general use is that due to Morse, which consists of two distinct signals suitably arranged in groups to stand for every letter of the alphabet, punctuation marks, numbers, etc. These two signals differ only in their time of duration, one being of short duration, the other long, the former representing a 'dot,' the latter a 'dash.' Fig. 3 gives the Morse Code now in general use:

A	.-	K	..-	U	..-
B	...-	L	..-.	V	...-
C	-.-.	M	---.	W	..-.
D	.-.-	N	-. -	X	..--
E	..-	O	---	Y	-. -.-
F	..-.-	P	..-.-	Z	---.
G	-.-.-	Q	..-.-	5	.....
H	....	R	..-.	6	.....
I	...-	S	...-	7	.....
J	..-.-	T	-	8	.....
1	.-.-.-	3	...-.-	9	.....
2	..-.-.-	4	....-.	0	.....

FIG. 3

The essential parts of the Morse receiver consist of an electro-magnet and an armature at the end of a lever, the other end of which carries a style. The attraction of the armature by the electro-magnet when it is excited causes the style to press against a roller over which a roll of paper passes, being worked by a mechanical arrangement. Figs. 4 and 5 illustrate the essential features of the receiver. Fig. 4

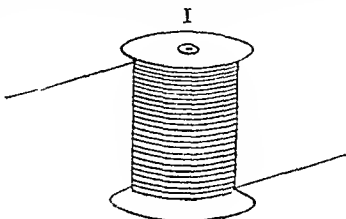


FIG. 4

represents the ordinary type of electro-magnet in use, consisting of a wooden bobbin around which is wound a large number of coils of insulated wire. It contains a central iron core, the end of which is seen projecting at I. Fig. 5 represents the armature I, pivoted at P, the style S, the roller N, and the roll of paper R working over the roller N. When the

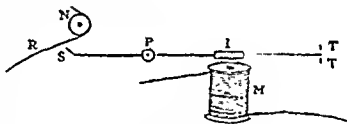
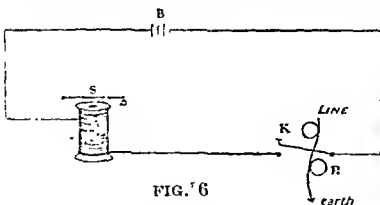


FIG. 5

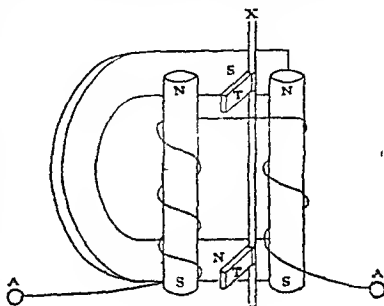
electro-magnet M is excited by the passage of a current I is attracted, and so the lever turns about P, pressing S against the paper. Immediately the current stops the attraction of I ceases and the lever springs back into its normal position. In this way by altering the direction of the current S may be kept in contact with R as long as necessary, and thus the 'dot' and 'dash' signals are written on the paper by the style, it being remembered that the paper moves across the style S with a uniform motion. The writing of the signals is not necessary to a trained operator, the tapplings of the lever against the stops TT and the duration between the successive taps being sufficient to interpret the signals. This led to the development of the sounder principle, which is now in universal operation. When the sounder is worked by the line current the method is called 'direct

working.' The ink-writer of Siemens and Halske was a great improvement upon the Morse receiver, owing to the greater facility effected for reading the marks on the paper. A small disc attached to the lever is rotated automatically in the opposite direction to that in which the paper moves. The disc revolves in a reservoir of ink, so that when the armature is attracted by the electro-magnet, and the disc thus raised into contact with the paper, it writes on the paper. Clearly then the length of the mark made on the paper will depend on the duration of the current working the electro-magnet. The automatic system invented by Wheatstone, owing to the high speed attainable by its use, is very largely employed in Britain and the U.S.A. In this system the message is prepared on a strip of paper by a machine which perforates the paper according to the 'long' and 'short' signals of the Morse Code. This perforated strip is run through an automatic transmitter, thus effecting a control of the several parts of the apparatus which results in the required currents being transmitted to the line. This system will clearly need a large number of operators to keep the transmitter working continuously, since a large number will be required to prepare the perforated strips. The receiver consists of a standard relay, which will be described later, with a tongue carrying an ink wheel which writes on a moving strip of paper similarly to the Digney ink-writer. The paper runs through the machine at a very great speed and is divided among the several operators who transcribe the message.



It is used chiefly in the transmission of press news, in that several perforated sheets are easily produced for one working of the machine. When the currents are transmitted over long distances, they become less strong when received, owing to the resistance of the line and leakage due to had insulation. This difficulty is overcome by the use of a relay. The sending battery is made strong enough to work a very sensitive receiving instrument, i.e., the relay. This relay gives out no audible sounds, but the

movement of its armature corresponds to that of the receiver it displaces. By this action it opens or closes a 'local' circuit in which the receiving instrument and battery are placed. Fig. 6 shows a simple 'local' circuit of this type. The relay R actuates the key K and so opens or closes the circuit of the battery B. This causes the armature of S the receiver to perform the requisite motions for the message to be received. The simplest relay is that of the *non-polarised* variety, i.e., there is no permanent magnetism attached to it. It



takes the form of an electro-magnet as in Fig. 4, the magnetism being caused by the passage of the line current through the coils. The absence of any permanent magnetism detracts from its sensitiveness, and thus the post office standard relay is of the *polarised* variety. In this relay the iron cores of the electro-magnet are polarised by a permanent horse-shoe magnet. Fig. 7 gives an outline of the standard relay. The poles of the electro-magnet are marked in the diagram. Behind them is placed the permanent magnet with its S. pole just behind the N. poles of the electro-magnets and its N. pole just behind the S. poles of the electro-magnets. Between the poles are the soft iron tongues T attached to a brass spindle. The presence of the permanent magnet induces magnetism in these tongues, and hence the end of the top tongue will have a S. pole and the bottom tongue a N. pole, these poles being situated between the poles of the electro-magnet. The spindle is free to rotate, and thus the tongues may move towards the left or right when attracted by the electro-magnet. In the normal state when the electro-magnet is not excited by the passage of a current, magnetic poles are induced in the iron cores by the iron tongues, the polarity being opposite to the inducing polarity. A current

entering at A will tend to reduce this polarity in one core and increase it in the other, and thus the tongues are attracted to one side and cause the spindle to rotate. This spindle actuates a contrivance to close the 'local' circuit. The sensitiveness of the instrument is clearly made very high, owing to the presence of the four pole pieces. All the above systems may be made to work in both directions at the same time on only one wire by means of the *Duplex Method*. The differential duplex depends on the following principle. Suppose an iron core is wound by two wires of equal

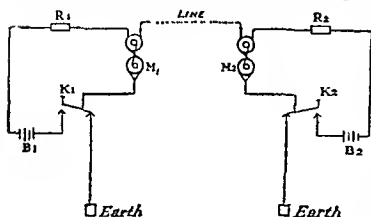


FIG. 8

resistance, in opposite directions, each wire being connected to a battery. If the current supplied by each battery is equal in value, their magnetic effects on the iron will neutralise each other and the electro-magnet will remain unmagnetised. If the two currents are not equal, the amount of magnetisation produced will depend on the difference of the two currents. Fig. 8 shows how this principle is applied in working. The stations are numbered 1 and 2, the corresponding parts having these numbers as suffixes to the letter denoting the part. The circuit after leaving the key K_1 divides into two parts, one wire going round the electro-magnet M_1 in one direction through the resistance R_1 , which is equal to the line resistance, back to the battery. The other wire winds around M_1 in the opposite direction and connects to the line wire and thence to the second station, where the arrangements are similar. If only one station is transmitting, then since R_1 and the line resistance are equal M_1 is unaffected, and since only one wire of M_2 is closed, then the receiving instrument will be affected. If both stations work together, since the resistances of both stations are the same, when both keys are depressed, clearly the currents in the line wire annul each other, the receiver in each station then being worked by the currents through R_1 and R_2 , these currents being called the *compensating currents*. Another important duplex

system is that due to Wheatstone, which depends on the Wheatstone bridge principle. If a double-current sounder be utilised and the above employed, the resulting system may be made *quadruplex*, i.e., eight operators may be at work on one line, four transmitting and four receiving. *Multiplex* working admits of six messages being transmitted simultaneously on the same line. Other systems are in use which employ two signals which differ from one another by their positions. It has been noted that when a current flows in a coil of wire, a needle placed on the axis of the coil will be deflected. Consider an ordinary galvanometer: When the current is sent through the coils, the needle will be deflected to the left of the observer, say. When the current is reversed, the needle will be deflected to the right. These two positions correspond to the 'dot' and 'dash' of the Morse Code, the left-hand position for the 'dot' and the right-hand for the 'dash.' The receiving instrument is very similar to this single-needle galvanometer. This receiver has the disadvantage that the operator has to read both the signals and his own writing at the same time. To surmount this difficulty, the needle is made to strike against two metallic plates, one on each side; sometimes a double-sounder principle is employed, which gives not only the different positions, but also a different sound, corresponding to the different positions. It will be observed that a double current is necessary to

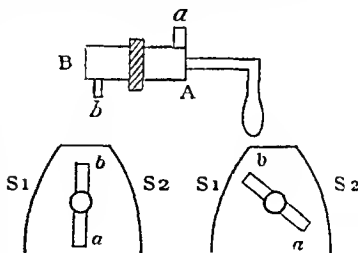


FIG. 9

actuate the needle. The *drop-handle* form is the one generally used with this type of instrument. The handle, Fig. 9, consists of two parts, A and B, insulated one from the other, the positive pole of the battery being connected to A and the negative pole to B. S_1 and S_2 are steel springs, a and b are metal projections from A and B. When the handle is at rest a and b rest between the springs S_1 and S_2 , without touching either, but when the handle

is moved to the right, say, *b* makes contact with S_2 and *a* with S_1 . If the handle is moved to the left, *a* makes contact with S_2 and *b* with S_1 , and thus by moving the handle to right and then to the left the direction of the current can be reversed. This type of instrument has largely gone out of use; it is now chiefly employed on railways. This method is, however, employed in signalling through long submarine cables. These cables act like condensers, and thus the currents which are sent into the line quite distinct from one another flow into each other before they reach the receiving instrument, and would require such a very high electro-motive force to actuate the instruments at the end of a long cable that the safety of the cable would be to a large degree sacrificed. The reflecting galvanometer introduced by Lord Kelvin indicates a signal when there is the slightest variation in the current. The signals are produced by a double-sending key as described in Fig. 8. The reflecting galvanometer has now been replaced by the syphon recorder. This instrument is made very similarly to the D'Arsonval galvanometer. It consists essentially of a movable coil which is capable of oscillating between the two poles of a permanent magnet. When reversed signals are received the coil oscillates and by means of a thread causes a corresponding movement in the syphon. This syphon consists of a thin glass tube, one end of which dips into a vessel containing ink, while the other touches a strip of paper, it being so arranged that this end is free to move across the strip of paper. The oscillations of the coil cause the syphon to vibrate, and the ink is thrown on to the paper in small dots. As the paper is made to travel onwards, the syphon will trace out a curve, and thus the movements of the coil will be recorded. The electro-magnetic alphabetical telegraph of Wheatstone is largely used in Britain. It consists of a large number of keys arranged on a circular dial, each key corresponding to a letter, punctuation mark, etc. The receiving instrument consists of a pointer which can rotate over the face of the dial having letters, etc., printed on its face. This pointer moves from letter to letter by steps, the motion being regulated by a ratchet motion. This motion is worked by the armature of an electromagnet which is actuated by the current regulated by the sender. By depressing one of the keys, the sending operator cuts off the current until that key is again raised. In this way the message can be spelt out at the receiving station. Hughes' recorder is still largely used on short cables and in

France. This consists of a large number of keys, each corresponding to a letter, etc.; the depression of any particular key causes a type wheel to record the letter, etc., at the receiving station. This recorder differs from that of Wheatstone in that the Wheatstone is non-recording, whereas the Hughes machine records the message. Further, the Hughes machine admits of duplex working. Writing telegraphs have not come into great use, owing to their very low working speed. Two line wires are required; the sender writes with a stylus and this causes variations in the resistance of the instrument. This variation causes a corresponding variation in the strength of a permanent current flowing in each line, which gives rise to differential magnetic action at the receiving station and so actuates a writing pen to record the signs on a strip of moving paper. The action of instruments which transmit writing, diagrams, etc., depends upon electrolytic action. At the sending station the writing is placed on a sheet of tin foil in insulating ink. This sheet is placed on a rotating cylinder, a metallic stylus connected to the line being in contact with it, and also connected to one pole of a battery, the other pole being connected to the tin foil and the earth through the cylinder. The receiving instrument is similar in construction, the actual receiving part being a piece of damp chemically prepared paper. Both the sending and receiving cylinders rotate together with the same motion. When the stylus moves on the tin foil, the shunt circuit through the stylus and tin foil operates, and there is no current in the line, but when the stylus moves on the insulating ink, the shunt circuit is cut out and the current passes through the line to the writing pen and hence through the damp paper. Electrolytic effects are thus produced and the writing marked on the paper.

Telegraph Lines.—The open lines have been most generally used, owing to their lower cost, better electrical condition, and being more easily accessible than cables which are placed underground. The open lines consist of bare iron or copper wire suspended from wooden poles by the side of railways, roads, and canal banks. In large towns the choice lies between overhouse or underground. The overhouse system presents difficulties of accessibility, and also the lines must be placed about 40 ft. high when crossing over thoroughfares. Often covered lines are suspended by point to point supports through the air but are mostly buried underground in pipes or led

through railway tunnels or other subways. On open lines each end of the wire is bound at the support to an insulating cup generally made of porcelain. In drier atmospheres than that of Britain glass is sometimes used. The supports consist of wooden poles, preserved by some chemical process; to these wooden poles an iron wire is fixed from the ground to above the 'roof' and branching off to the various arms on which the insulators are fixed. This wire is used to minimise lightning effects and for carrying stray currents to the earth. Iron poles are used in tropical countries owing to climatic conditions, transportation difficulties, and the attack of insects.

For *Submarine Cables*, see **CABLES**. See Preece and Sivowright, *Text-book of Telegraphy*, 1910; Herbert, *Telegraphy* (British Post Office System), 1907; Bright, *Submarine Telegraphy*.

Telegraphy, Wireless, see **WIRELESS TELEGRAPHY**, and **ELECTRICITY—Electro-magnetic Waves**.

Telemachus, the son of Odysseus and Penelope. Left as a child when his father set out for the war with Troy, after his father's absence had lasted for about twenty years he set sail in search of news of him. He visited Pylos and Sparta, and returned to Ithaca in time to help his father in the famous fight with the suitors. He succeeded Odysseus as King of Ithaca. (Homer's *Odyssey*.)

Telemeter, see **RANGEFINDERS**.

Teleology, see **KANT** and **HEGEL**.

Teleosteans, or Teleostei, see **BONY FISHES**.

Teleosaurus, a marine genus belonging to the family Teleosauridae, of the crocodile order (class Reptilia). It is readily characterised by the teeth being inclined horizontally outwards, and is confined to the Lower Jurassic beds.

Telepathy, see **PSYCHICAL RESEARCH**.

Telephone Bells, see **ELECTRIC BELLS** AND **ALARMS**.

Telephony, a system of producing sounds at a distance by the agency of electricity. The system was invented by Graham Bell (1876). The essential parts of the system consist of a receiver, line wire, and a transmitter. The transmitter and receiver are similar in construction, their action depending on the phenomena of electro-magnetic induction. In the article on electricity it has been pointed out that if a coil of wire be placed in a magnetic field, any change in the strength of that field or any change in the number of magnetic lines of force through the coil produces a current in the coil which lasts only so long as that change is taking

place. For an increase in the number of lines of force the current flows in one direction, and for a decrease it flows in the opposite direction. Consider the bar-magnet NS and a piece of soft iron P held near one of its poles (Fig. 1). The introduction of P produces a re-arrangement of the lines of force, the lines tending to go through P rather than through the surrounding air. Any movement of P towards S will cause more lines to



P

FIG. 1

go through P, while if P moves away from S less lines will traverse P. If S and P are connected by a coil of wire, a current will thus be produced in the coil. This current may be used by a wire to connect the coil with a second coil placed with regard to a bar-magnet and plate, these currents flow to this coil. The currents thus tend to increase or decrease the polarity of this second magnet according to the direction of the current. If the current is alternating the increase and decrease also alternate, and thus the second plate is made to execute a vibrating motion similar to the first. Sound consists of a wave motion in the air; if these sound waves fall on the plate P they cause the plate to vibrate, this vibration and its resulting electrical effects, as indicated above, cause the second plate to vibrate similarly, and thus sound waves are given out at the receiving end, which are heard by the operator. Modern telephone construction, although obeying the above principles as fundamental, is a more complicated arrangement than the above. Fig. 2 gives the transmitter as designed by Bell. NS is the bar-magnet enclosed in a wooden case, C the coil of wire surrounding one of its poles. This coil of wire consists of a bobbin around which is wound a large number of coils of thin insulated wire, the ends of the wire

being connected to the terminals TT. The plate P is fixed in front of the pole fixed between the casing MM and the wooden case. The casing MM contains a central aperture exposing the plate P, into which aperture the operator speaks. P is caused to vibrate, induction currents are set up in C, and are conveyed through the terminals TT to the line and hence to the receiver. The receiver is the

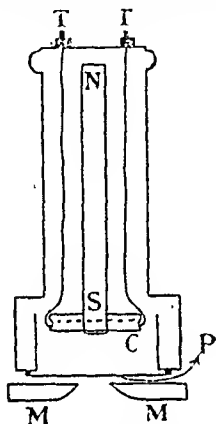


FIG. 2

same in construction as the transmitter. Owing to the great resistance of the connecting lines, the operator receives the sounds with diminished strength, owing to the currents losing much of their energy in overcoming this resistance. Thus the above has a great disadvantage for long distances. To surmount this difficulty, the transmitter is now made as an adaptation of the microphone (see MICROPHONE). In this type of transmitter, the vibrating plate consists of a plate of carbon, fixed round its edges. Another plate of carbon is placed just behind, the intervening space being filled with very small pieces of carbon. One terminal is connected to a battery and the other to the line wire. The other terminal of the battery is connected to earth. A similar arrangement is made at the receiving station. The carbon particles form the bad contact of the microphone, and sound waves falling on the carbon plate cause these carbon particles to vary their resistance and thus cause fluctuations in the current, which are detected at the receiving station. This, however, suffers from the disadvantage of long distances, but in this case the energy is derived

mostly from a battery and may be augmented by a transformer. Fig. 3 shows a simple circuit of this type. M represents the microphone, B the battery, R the receiver, and T the transformer. The line wires, or the wires connecting the two stations, generally consist of copper wire. In

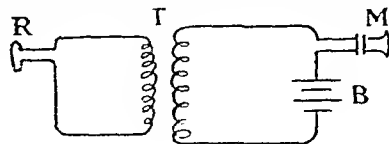


FIG. 3

towns they are placed underground, in a lead, insulated one from the other by a thick wrapping of paper. For very long distances the wires are placed overhead, fastened to pots of earthenware or porcelain for insulation purposes, and supported on poles.

Systems.—The simplest case is that of telephoning between two stations. The only requirements are a transmitter, receiver, a call bell, and the intervening wire. The return circuit may be made through the earth. The microphone transmitter and bell are generally worked by the same battery. A switch of some type is used for cutting the receiver or bell out of the circuit. Generally the switch works automatically. The receiver is supported by a frame, which is pressed down by the weight of the receiver. The bell is now in the circuit; this being the normal position of the receiver, the bell is always ready for action when the instrument is not in use. In taking up the receiver the frame rises, being actuated by a spring, and so cuts the bell out of the circuit and connects the receiver with the line. Fig. 4 represents

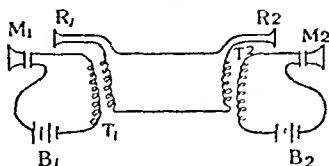


FIG. 4

such a system, each station being supplied with both transmitter and receiver. Let the suffixes 1, 2 denote the station. Both stations are constructed in the same way, M₁ denoting the microphone transmitter, R₁ the receiver, B₁ the battery, and T₁ the transformer, M₂, R₂, B₂, T₂ de-

noting the same parts in the second station. When several stations are to be connected, each set is connected by a wire to every one of the others. In large towns, where there are numerous subscribers, each is connected to

lators. The condenser *c* prevents any current from the battery flowing through the bell circuit, and thus a dynamo is employed at the central station to work the bell through the condenser. The terminals of the dynamo are connected to the operators' desks, so that any subscriber can be called up by pressing the corresponding button. If the subscriber wishes to call up the exchange, he simply removes the receiver off the frame and thus makes a complete circuit through *s* for the battery at the exchange. This works a relay at the exchange and so lights up an electric lamp, a lamp being placed in the circuit of every subscriber. The lighting of the lamp indicates that a call has been made from that subscriber. The 'jacks' used in each subscriber's circuit consist of three parts: a long spring, a short spring, and a ring which fits into the woodwork of the switch-board. The two springs make contact with the line wires, while the ring connects with a relay. Each of the three parts is insulated one from the other, and they are placed so that they make contact with corresponding parts of the switch springs. The operator has two of these jacks, one is the calling jack and the other the answering jack. The jacks, when put into the switch springs, bring into action the battery and connect the necessary circuits. In each of the circuits relays and lamps are introduced, which can be worked by either subscriber concerned, indicating after the restoration of the receiver to the frame the end of the conversation. Various methods are employed in different systems; in some each subscriber has a small dynamo for actuating the call bells, and also a separate battery for working the microphone, but the one above described is the one in general use. The National Telephone Company owned the telephone service of the United Kingdom up to 1912. Now it is in the sole possession of the Post Office, an agreement between the National Service and the Post Office being made in 1905, by which the Post Office took over the complete service after the end of 1911. Local telephone services are worked by some municipalities. See Precece and Stubbs, *Telephony*, 1893; Herbert, *Telephone System of Post Office*, 1904; Webb, *Telephone Service*, 1904.

Telerpeton, a fossil reptile found in the Upper Trias of Elgin. The species is small in size and the genus agrees with the Homœosauridæ in its acrodont dentition, though differing by the presence of tusk-like teeth at the extremities of the jaws, and by the re-

minating in a small 'jack' or spring. These jacks are all mounted on a switch-board, each jack having its number and capable of being connected to any other jack by means of a flexible wire. This method is useful for a small central station, but when the number of subscribers is large it would lead to confusion. In large stations the 'multiple board' system is utilised. The subscribers are classified into groups of two or three hundreds on one board, each board being worked by one operator. Each operator has in front of him the indicators for the subscribers on the board he controls, a jack also being provided for each subscriber. In

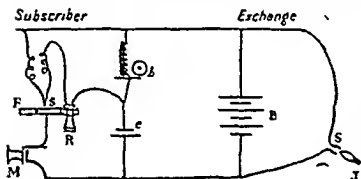


FIG. 5

this way a subscriber may be connected to any other by passing along the boards. On the trunk wire system for connecting districts the trunk wire terminates at each exchange, and so may be connected to the jacks on the exchange. Fig. 5 illustrates the connection from the exchange to a subscriber. Here it will be observed that the whole apparatus is worked by the battery at the central exchange, which consists of the battery B, the subscriber's jack J, which fits into the socket S. The subscriber's portion consists of the magnetic bell *b*, a condenser *c*, receiver R, the microphone M, and the frame F supporting the receiver. The diagram shows the apparatus when not in use. The frame F makes or breaks the circuit through R at *s*. When R is taken off

the bell being in the circuit, ready for action. The condenser *c* is used for cutting off the continuous current from the central battery. All subscribers are joined up to the central exchange in this way, all the lines being joined across the same battery, which consists preferably of accumu-

duction in the number of the phalangeals of the fifth digit of the pes to two.

Telescope. This instrument is used for apparently magnifying a distant object and bringing it nearer to an observer. A telescope consists essentially of two parts: (1) The object glass or objective, and (2) the eye-lens. In refracting telescopes the objective consists of a lens or combination of lenses, which forms a real image of the object. In reflecting telescopes the incident rays are received by a concave mirror, which forms a real image of the object. The real image in both types of telescope is viewed through the eye-piece, which simply forms a greatly magnified unreal image of the first image. Several persons are credited with having anticipated, if not actually made, a refracting telescope. It is certain, however, that in 1608 a Dutch spectacle-maker, Lippershey, constructed one. Galileo heard of the Dutchman's invention and immediately set to work to construct one. Instruments of the same kind were used by Marlius and Harriot. The first night Galileo used his telescope, which had a magnifying power of 30, he discovered the mountains on the moon and the four satellites of Jupiter. Galileo's instrument consisted simply of convex and concave lenses fitted at the opposite ends of a tube. The convex lens, the objective, forms a real inverted image of the object. Between the image and the objective the concave lens is placed. This forms a largely magnified and reinverted image. The telescope of Galileo is extremely short and handy for manipulation. Thus his system has been used in the construction of opera-glasses. In the astronomical telescope, described first by Kepler, the objective, O in Fig. 1, consists of a large convex lens

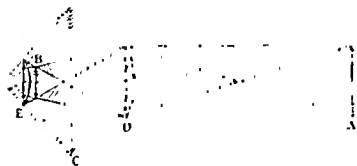


FIG. 1

of long focus. This forms a real, diminished inverted image B of the object A. The eye-lens E is a convex lens of short focus. This simply magnifies and does not reinvert the image B. An instrument which gives an inverted image is obviously of little use for viewing terrestrial objects. This difficulty is overcome in the terrestrial telescope. In this tele-

scope a convex lens is placed between B and E of Fig. 1. This forms a real and reinverted image of B. This second image is then magnified by the lens E. It can easily be shown that in all refracting telescopes the magnifying power is the ratio of the focal lengths of the objective and eye-lens respectively. It is necessary then to have an eye-lens of small focal length and an objective of large focal length. The length of such a telescope must not be invariable. In the first place, the image given by the objective of a nearer object is farther from the objective than the image of a farther object. In the second place, the eye-lens must be nearer the image thrown by the objective for an observer who has normal sight than for one who is short-sighted. Therefore the telescope is fitted in a metal tube whose length can be altered at will.

Defects of refracting telescopes.—In Galileo's telescope the image seen was very blurred and tinted with various colours. This was due to the defects, spherical and chromatic aberrations. A point source, on refraction through the lens of a telescope, does not give a point image, but a blurred blotch. This is due to spherical aberration (*q.v.*). The blurred blotch is also coloured because the lens of the telescope has different indices of refraction for various colours. This second defect is called chromatic aberration (*q.v.*). Huyghens, Cassini, Bradley, and others set about to avoid these defects by constructing huge tubeless 'aerial' telescopes. Their results, however, though interesting, were only partially successful. In 1758 a scientist named Dolland succeeded in constructing an achromatic lens. There are two distinct defects in chromatic aberration: (1) The images formed by different colours are of different sizes, and (2) the focal length of the lens varies for the several colours. These two defects can only be corrected approximately at the same time. Dolland found that the dispersion for various kinds of glass differed, and that the dispersion of one kind of glass could be made to neutralise that of another. He constructed an objective consisting of a convex lens of crown glass fitted by a concave lens of flint glass, and thus obtained a compound lens whose focal length was constant for most, but not all, the colours. Not only that, but by altering the curvature of his lens somewhat, he corrected for spherical aberration also. Since Dolland's time the refractors have been considerably improved, until a colourless definite image can approximately be obtained. But even now

the achromatism is not perfect because of the irrationality of flint and crown glass. The deviation for various colours is not proportional in the two glasses, so that only certain selected colours can be brought to the same focus, the remainder forming a halo round the image. Although large refractors are more difficult to work with than small ones, they give a much more brightly illuminated image and have greater space-penetrating powers. The resolving power also increases with the size of the aperture. Dr. Blair has obtained a solution of mercury in hydrochloric acid which is more refractive and dispersive than crown glass. He used a lens of this solution in combination with one of flint glass and found that there was no 'irrationality.' He made a telescope whose aperture was only one-third the focal length, and obtained an image with no residual colour.

Reflecting telescopes.—There are three types of reflecting telescope. Fig. 2 (a) gives a diagram of Newton's

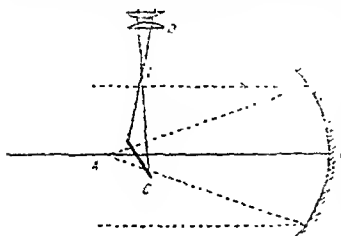


FIG. 2 (a)

reflecting telescope. The rays were received by a concave mirror of large focal length. The mirror would form a real image at A. The rays, however, do not reach A, but are reflected from a plane mirror C so as to be received in an eye-piece D. In Gregory's

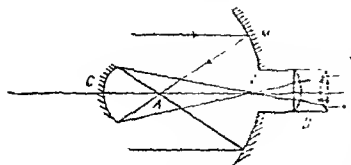


FIG. 2 (b)

telescope, which was the first telescope of this kind to be made, the concave mirror was pierced by a small central aperture (Fig. 2 (b)). The rays were reflected from the large mirror and received on a smaller

concave mirror C, which forms an image at I. This image is viewed through the aperture by means of an eye-piece. Cassegrain's telescope is a modified form of Gregory's, in which spherical aberration is overcome by using a convex mirror at C. In Herschel's telescope (Fig. 2 (c)) the axis

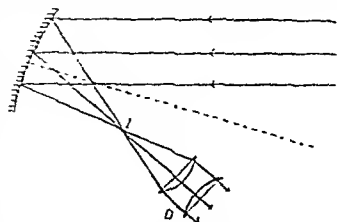


FIG. 2 (c)

of the mirror is inclined to the incident rays. The image I is viewed directly by means of an eye-piece D. The advantages of using reflecting telescopes are: (1) Chromatic aberration is entirely absent, (2) they can be made of much wider aperture than refracting telescopes. The image, however, is not generally so bright as that obtained from the refracting telescope. Herschel devised his telescope to avoid loss of brightness by a second reflection, but even here the image is not so bright as that from a refracting telescope. The great defect in reflecting telescopes is due to spherical aberration. A point source can only have a point image by reflection if the reflecting surface is a prolate spheroid formed by the rotation about its long axis of an ellipse, of which one focus is the object and the other the image. If the object is at a very great distance, a star for instance, the ellipse becomes a parabola. Thus, spherical aberration can be partially overcome by using parabolic mirrors. Even here, though we may have one point in focus, the other points of the object may not be so, but the error is small. In the

the error modification the convex mirror is hyperbolic. This gives a much more definite image than a spherical mirror. The defect due to spherical aberration increases with the area of the reflecting surface. But by using a large reflecting surface the brightness of the image is increased. Parabolic mirrors, however, require extremely careful manipulation in their formation. In the earlier mirror the reflectors were huge masses of tin or silver. Polishing them often destroyed their parabolic

shape. About 1870, glass, covered with a thin film of silver, came into use as a reflector. This film of silver, which is deposited chemically, is extremely brilliant when fresh, and can be polished without fear of destroying the shape of the mirror. It can easily be dissolved off by means of acids and a fresh film deposited. This kind of reflector has now entirely superseded the former. Owing to its perfect achromatism the reflector has a great advantage over the refractor in spectroscopical work. Glass lenses also absorb light to some extent and show selective absorption for rays of short wave length. Ultra-violet spectra cannot then be photographed by a reflecting telescope. The absorption of light also sets a limit to the size of refractors and thus on the width of aperture. Owing to its cheapness in construction, the reflector has an advantage over the refractor. The latter, however, is more suitable for purposes of exact astronomy because of its adaptability to forms of measuring apparatus.

Telescopium, a southern constellation.

α T., 3.8
Lacaille,
and Ara.

Telford, Thomas (1757-1834), a Scottish civil engineer, born at Eskdale in Dumfriesshire. Among other works that he undertook may be mentioned (1793), hours c Canal.

he gathered from the fact that he was the engineer of more than 100 bridges in Scotland alone. He was one of the founders of the Institute of Civil Engineers (1818). See his *Autobiography*, 1838. He is buried in Westminster Abbey.

Tell, see ALGERIA and TUNIS.

Tell, William, the hero of a Swiss legend, which first appears in a chronicle written between 1467 and 1476. The principal source, however, of the life and deeds of T. is the *Chronicon Helveticum* of Ægidius Tschudi (1505-72), from which Schiller took his drama *Wilhelm Tell* (1804). The story centres round the struggle for independence of the cantons Schwytz, Uri, and Unterwalden, and is as follows: T. having refused to do homage to the cap which Gessler, the Austrian governor, set up for that purpose in the market-place, was taken prisoner, and on being brought before the landgrave was promised his liberty if he could cleave an apple in twain, placed on his son's head, at the distance of eighty paces. He accomplished the task, but confessed on compulsion that the other arrow

in his hand was meant for Gessler's heart had he failed, whereupon he was again seized and taken on the lake en route for Küssnacht Castle. But a storm having arisen, T. was asked to steer the ship, and while so doing effected his escape. He afterwards killed the landgrave, thus becoming the deliverer of his people. See Schiller's *Wilhelm Tell*, trans. by Albert Latham (Temple Classics).

Tell-el-Amarna, a place in Middle Egypt, between Memphis and Thebes, on the r. b. of the Nile, with ruins of temple and palace of Amenophis IV. Notable for the discovery in 1887-88 of the 'letters'; about 300 clay tablets recording correspondence between Egypt and Assyria, Babylonia, etc. In 1891-92 Flinders Petrie carried on further researches. See Winkler, *Der Thontafelfund von El-Amarna*, 1889-90; *Keilinschriftliche Bibliothek*, vol. v., 1896; Davies, *Rock Tombs of El-Amarna*, 1889-90; Knudtzen, *Die El-Amarna Tafeln*, 1907-9.

Tell-el-Kebir, a vil. in the N.E. of Egypt, situated on the Freshwater Canal. It owes its fame to the fact that it was the scene of Lord Wolsey's (then Sir Garnet) great victory over Arabi Pasha, Sept. 13, 1882.

Tellers of the Exchequer, four officials whose duties were to receive money paid into the Exchequer, pay out money according to the warrant of the auditor of receipts, and keep accounts for the Lord Treasurer. The office was abolished in 1834. See TALLY.

Telley, Gabriel, see TIRSO DE MOLINA.

Tellicherry, a tn. and seaport of British India in Madras Presidency and Malabar dist. It is situated between the French settlement of Mahé and Cannamora, 38 m. N.N.W. of Calicut, and is protected by a natural rock breakwater. The exports are coffee, spices, sandalwood, cocoanuts, etc. Pop. 28,000.

Telloh, or Tello, a site of ruins in Asiatic Turkey, Mesopotamia, recently excavated by De Sarzec. These explorations have supplied a series of ancient monuments of architecture and sculpture which can be dated. The chief portable remains are in the Louvre.

Tellurium (Te, 127.6), a rare element of the sulphur group. It occurs in the free state in nature, but is chiefly obtained in combination with other elements, as in tellurite (TeO₂) and tetradyrite (Bi₂Te₃). It is a bluish-white solid with a metallic lustre (melting-point 452° C.; sp. gr. 6.26). T. forms tellurides with hydrogen and the metals, corresponding to the sulphides. Two oxides, the dioxide and trioxide, are known,

which give rise respectively to the two acids, tellurous acid and telluric acid.

Tellus, see GÆA.

Telsbi, or Telszei, a dist. of Russia, in the gov. of Kovno and 178 m. N.W. of the city of that name, on Lake Matis. Pop. 11,200.

Telugu, a language spoken in S. India. It belongs to the Dravidian group of languages. The earliest known work in the T. language is a translation of the epic *Mahābhārata* (7.v.).

Temanza, Tommaso (1705-89), an Italian architect, better known for his writings relative to art than for the buildings which he executed. In 1742 he became chief of the Commission of Engineers, and in this position was involved in several literary disputes. His chief work is the *Fite de' più Eccellenti Architetti e Scultori Veneziani*, 1778.

Temax, a tn. of Mexico in the state of Yucatan, 55 m. E.N.E. of Mérida. Pop. 10,000.

Tembuland, a div. of the Cape of Good Hope, S. Africa, situated near the coast, to the S.W. of Griqualand East. It covers an area of 4117 sq. m. The name is derived from a Kaffir tribe, who claim to be descendants of Tembu. The coloured pop. in 1911 was 227,900 and the European 8200.

Teme, a riv. of Wales, rising in Montgomeryshire, near Newtown. It flows S.S.E. to within 3 m. of Worcester, where it joins the Severn. It is noted for grayling. Length 60 m.

Temenos (Gk. *τέμενος*, *temenon*, to cut), the Greek term in archaeology given to a piece of land marked off and consecrated to sacred uses; any sacred enclosure, as that surrounding or belonging to a temple.

Teméraire, a battleship of the British navy, begun in 1907 and completed in 1909. She has a displacement of 18,600 tons, a length of 520 ft., beam of 82 ft., and a maximum draught of 29 ft. She has sailed at a speed of 22·7 knots.

Temesvar, a royal free city in the co. of Temes, Hungary, stands on the Bega, 190 m. S.E. of Budapest. It is strongly fortified; is the see of a Roman Catholic bishop and of a Greek Orthodox bishop, with a fine cathedral and a castle. It has various manufs. Pop. 72,555.

Temir-Khan-Shura, a tn. of Russia in Transcaucasia, and cap. of the prov. of Daghestan, 418 m. N.E. of Tiflis. It is extremely subject to fevers. Pop. 10,000.

Tempe, a famous valley of N. Thessaly in Greece. It is situated between the mountains Pelion and Ossa, and through it runs the R. Peneus. It has become proverbial for beautiful scenery.

Tempera, or Fresco Secco, see FRESCO PAINTING and MURAL DECORATION.

Temperament, the modification of exact acoustic intervals so as to make relative notes correspond in successive octaves. Such a device became necessary with the progress of harmonic writing, and in the early 16th century the Pythagorean third (ratio 81 : 54) was superseded by the major third in ratio 5 : 4. Further changes were made in adopting 'mean-tone' T. (17th to 18th century), but although this gave six major and three minor keys with fairly pure intervals, the other keys were so bad that modulation was impossible. The best system was the equal T., dividing an octave into twelve equal parts, or 12 semitones. J. S. Bach worked on this T. and proved its modulatory value by writing his books of Preludes and Fugues for Well-tempered Clavier through all keys. In equal T. the octave is the only pure interval, the fourth and fifth being least incorrect of the others.

Temperance. The universal recognition of the social, moral, and physical evils which may be directly or indirectly traced to the excessive consumption of alcohol is perhaps the most promising and significant tendency in the collective effort of modern society. The whole mental attitude of civilised mankind has changed within the last century. Nor has the more critical attitude adopted been unaccompanied by the most widespread constructive endeavour towards the abatement of intemperance. However, it seems tolerably safe to assume: (1) That the non-drinking or teetotal numbers of the population have steadily increased; (2) that during the last eighty years the *per capita* consumption of absolute alcohol has slightly decreased; (3) that the heaviest drinking occurs chiefly among (a) degenerates and loafers, and (b) those whom poverty, unemployment, and illness have driven to this strange asylum of forgetfulness. There is a close relationship between intemperance on the one hand, and on the other pauperism, insanity, and crime. The Committee of the Lower House of Convocation of the Province of Canterbury (convened in 1869) reported that at least 75 per cent. of the occupants of workhouses and a large proportion of those in receipt of out-relief had become 'pensioners on the public, directly or indirectly, through drunkenness and consequent improvidence.' The percentage of male cases of insanity due to intemperance has for the last forty years, according

to the Lunacy Commissioners, been on an average about 18·6; of female cases, 7·1. Dr. Edgar Sheppard, one time superintendent of Colney Hatch Asylum and professor of psychological medicine, put the figure at from 35 to 40 per cent. It seems safe to assume that nearly one-fourth of the total insanity of the country is due to drink. The following table of particulars from the Report of the Commissioners of Prisons in 1898, cited in Rowntree and Sherwell's *The Temperance Problem and Social Reform* (1899), goes most clearly to illustrate the relationship of drink to crime. The table relates 1166 commitments to Warwick prison from April 1897 to March 1898 :

Charged with being drunk . . .	201
Crimes directly due to drink . .	287
Crimes arising from avoidable and unavoidable poverty—probably 50 per cent. of the poverty arising from drink . .	264
Crimes due to the moral state of character, 30 per cent., perhaps, the result of drink, i.e. of the said moral condition . .	199
Arising from passion, with more or less provocation . . .	68
Bad company (the drink element comes in here again) . .	86
Negligence, imprudence, etc. . .	61
Total . . .	1166

So far as political measures for reform are concerned it is to be noted that in England (and in a lesser degree in U.S.A.) there is considerable justification for the widespread accusations levelled at the liquor trade and its vast wealth and resources. The *Brewers' Almanack* gives a list of over 120 brewery and distillery companies in the United Kingdom which have a share and debenture capital of over £70,000,000. Vested interests on this scale are eloquent to explain why the 'trade' . . .

a power.
munity.
adopted

T. movement in 1826 may be conveniently classified into: (1) Prohibition and local option, (2) the Scandinavian company system, (3) state monopoly or municipal control, (4) the institution of counter attractions, (5) high licence, (6) taxation of liquor. Prohibition has been adopted in certain of the United States, and, as exemplified in that country, means the suppression of the buying and selling of liquor within the limits of the particular states which have adopted the prohibition laws, the effect being that there is nothing to prevent a consumer from transporting into a prohibition state liquor for his

purposes purchased in a non-prohibition state. Thus stated, prohibition is clearly outside the scope of this article altogether, since it aims, or seems to aim, not at T. but at teetotalism. In so far, however, as the principle is attempted to be made operative through a system of local option, it is relevant, though it seems hotter in this connection to distinguish between the two policies by calling one *national prohibition* and the other *local option*. It has met with but indifferent success, many states having tried and abandoned the experiment. The chief causes of its comparative failure seem to be the profitableness of the liquor traffic, the political influence of the liquor trade in the prohibition states, and police corruption or 'graft.' There is, it must be conceded, little to be said for a system which purports to abolish a commodity which is a necessary of life to the vast majority and which, by the curious argument of its protagonists, is only effective where there are 'neighbouring facilities for the purchase of liquor by those who are accustomed to use it.' English T. organisations have with but few exceptions never favoured the principle, but are for the most part strongly in favour of that of local option (*see LOCAL OPTION*). Under the Scandinavian company system—called the Gothenburg system, from the fact that that town was the first large town to adopt it—the liquor traffic is controlled by companies to whom the municipal authorities transfer all liquor licences, such companies undertaking to carry on the trade solely for the good of the working classes and not to derive the slightest *private* profit from the traffic other than the ordinary rate of interest on the capital invested. If a manager fails to carry out the bylaws of a Bolag or Samlag (the Swedish and Norwegian name for such companies respectively) his dismissal can be promptly effected without the necessity of a costly trial. The concurrent features of this system are the establishment of eating-houses and reading-rooms in the Bolag or Samlag premises, the refusal to serve young persons with liquor, the reduction in the hours of sale, and the voluntary abandonment by the companies of a number of the licences handed over to them. The system of state monopoly has been adopted in Russia and S. Carolina. It is accompanied by the abolition of on-consumption of spirits in the state-drinking premises, and many other stringent provisions against public inducements to tipping, and it has also been effective in reducing intemperance in a country which was over-

run with the evil. The high licence scheme of Pennsylvania Union ca of the the Slocumb Law of Nebraska in 1881. Its object is to reduce the number of drinking saloons, firstly by vesting the power to grant licences in the hands of a quarter sessional court or other public authority, and secondly by fixing the fees for licences at an

are always ready purchasers of that in many places the incapable or un-

licensed drinking establishments. (As to the system of high licence duties, see under LICENSING AND LICENSING LAWS.) On the whole the most promising 'solution' of the drink problem lies in the direction of the municipal control of the drink traffic. Mr. Sherwell and Mr. Rowntree, supported by an imposing body of sympathisers, thus state their conclusions for the system

(1) That localities traffic either direct or indirect companies under the direct supervision of the central government and within statutory limits; (2) that the whole of the profits shall in the first instance be handed over to a central state authority; (3) that the only benefit which a locality shall receive from the profits shall be in the shape of an annual grant, in ratio to population and not profits earned, from the state authority for the establishment of recreative centres; (4) that the right of prohibition shall be given to every local authority, which, if exercised, shall not do bar such authority from the annual grant above alluded to; and (5) that the co-operation of influential citizens, outside the local governing body, shall be invited in the

we So. Gothenburg and Bergen Public-house Systems; Malins, *The Gothenburg System*, 1897; Gould, *Popular Control of the Liquor Traffic*, 1894; Joseph Chamberlain, *The Right Method with the Publicans*, 1876; E. J. Wheeler, *Prohibition: The Principle, the Policy, and the Party*, 1894; Mackenzie, *Sober by Act of Parliament*, 1896. See also INEBRIATES; LICENSING AND LICENSING LAWS.

Temperature, in physics, is the condition of a body on which its power of transferring or receiving heat from another body depends. The sensation

of touch gives no accurate knowledge as to whether one body is hotter than another. In order to do so one of the other effects which heat produces on matter is employed. The effect generally made use of is, that most substances, when heated, change in size, and in gases the change is proportional to the T. over a very large range. Of liquids, mercury is generally adopted. Its expansion is not strictly proportional to the T.; thus most thermometers contain this liquid, the T. being indicated by the measurement of the volume of mercury contained. Alcohol is used for the measurement of low Ts. owing to its low freezing-point, but is of little use for high Ts. owing to its low boiling-point. The most accurate thermometer is the gas thermometer. The change of state of substances is also used for indicating T., the unit of T. being obtained from the range of T. between the melting-point of ice and the boiling-point of water at 760 mm. pressure, the range being divided into 100 equal parts on the Centigrade thermometer and 180 on the Fahrenheit. The variation of the resistance of a wire to an electric

which occurs with a change also utilised for the measurement of T. These electrical thermometers are made to yield very accurate results. For absolute T., see THERMODYNAMICS; GASES AND VAPOURS; PYROMETER; and THERMOMETER.

Tempering, a process by which steel is brought to any required degree of hardness, toughness, and elasticity. The process consists essentially of heating the steel to a high temperature and suddenly cooling it by immersion in water.

Tempesta, Antonio (1555-1630), an Italian etcher and painter, executed frescoes for the church of Gregory of the Innoc of Rono.

Tempesta, Cavallere (1632-1701), a Dutch painter, born in Haarlem, and was called Pieter Molyn. His cognomen 'Il Tempesta' has reference to the excellence of his seascapes and storms, whilst a second, 'do Mulleribus,' recalls his shameless profligacy, which led to his wife's murder and a sixteen years' term of imprisonment.

Tempio, or Tempio Pausania, a tn. of Sardinia in the prov. of Sassari, and 30 m. E.N.E. of the town of Sassari. Pop. 14,000.

Templars, or Knights Templars, the most famous and most powerful of the great military orders of the middle ages. They are known also as the Brethren of the Temple at Jerusalem, the Soldiery of the Temple, or the

Soldiers of Christ. The great religious orders are three in number, and all owe their origin to the burst of crusading zeal which marked the 11th and 12th centuries. Beside the T., we have also the Knights of the Hospital of St. John of Jerusalem (commonly called the Knights Hospitallers) and the Teutonic Knights of St. Mary of Jerusalem, or German Knights of the Cross. Of these three orders, that of the Temple was the first, and that of the Teutonic Knights was the last. The Order of the Templars was founded in 1118 or 1119 by nine French knights, then fighting in the Holy Land. Their original vow was simply to maintain free passage for the pilgrims who should visit the Holy Land. The name that they first took was the Poor Soldiers (*Pauperes Commilitones*) of the Holy City, and they professed to have no source of subsistence but the alms of the faithful. The king of Jerusalem, Baldwin II., gave them their first place of residence, a part of his palace; to which the abbot and canons of the church and convent of the Temple, which stood adjoining, added another building for keeping their arms. From this last they obtained the name of T. The militant rule of the T. attracted general attention, and so favourably was it regarded that in 1120 the Hospitallers obtained from Pope Calixtus II. a new rule on a similar plan. The T. were first regularly formed into an order under the next pope, Honorius II., who confirmed their regulations and assigned a white mantle as their badge, to distinguish them from the Hospitallers, who wore a black mantle with a white cross. In imitation of this white cross, Pope Eugenius added a red cross on the left breast to the mantle of the T. The T's standard, *Beauseant* (O.Fr., a black and white horse), was a red cross on a field striped black and white, and *Beauseant* was the famous war-cry of the order. The order spread rapidly throughout Europe; legacies and donations in lands and money were showered upon it by persons of all ranks; members of the noblest families in every nation of Christendom eagerly sought to be joined to it. The rapid increase in power and wealth was injurious. Of the three vows of poverty, chastity and obedience, the first two were utterly disregarded. The order, indeed, became a by-word for the very contraries. The constitution of the Knights Templars was simple. At the head was the grand master, who was not only elected by the chapter or general body of the knights, but was also very much controlled by it. Under the grand master was his seneschal or lieutenant, and

other high officers were the marshal, the treasurer, etc. The several countries in Asia and Europe in which the order had possessions were denominated provinces, and each of them was presided over by a resident chief, called indifferently a grand prior, grand preceptor, or provincial master. Under the provincial masters were the priors, otherwise called bailiffs or masters, who each had charge of one of the districts into which the province was divided; and finally, under the priors were the preceptors, each of whom presided over a single house or establishment, hence called a preceptory. The head province was that of Jerusalem, and here the grand master resided till 1187. After this he retired to Acre, and then to Limisso. The history of the Knights Templars would embrace the history of the wars of the Christians against the Infidels in the East for all the time they lasted after the establishment of the order. For more than 170 years the Soldiers of the Temple formed the most renowned portion of the Christian troops, and almost every encounter with the enemy bore witness to their powers and daring. The destroyer of the T. was Philip le Bel of France, who had long been their foe. He compelled his creature, the pope, to summon the grand master, Jacques de Molay, to Europe. In 1307, whilst Molay was at Paris, two individuals of notoriously evil character lying in prison made certain revelations accusing the T. of heresy, idolatry, unbelief, and a number of foul practices. On Sept. 12, sealed letters were sent throughout France, to be opened the next day, and then all the T. in France were seized simultaneously. By torture and other means more revelations were secured, and Philip managed to persuade the other European princes to join with him against the Templars. By 1320 the order was at an end, except in Portugal where it merely took the new name of the Order of Christ.

Temple, or Templet, a pattern by which to shape something, especially in profile; it is usually flat and made of thin wood or metal. The name is also applied in building to a short strong stone or timber used to distribute thrust or weight.

Temple, The. The Heb. word *hēkāl* is translated in the O.T. sometimes as 'temple,' and sometimes as 'palace.' The idea of the royal residence is, of course, common in these cases. Sometimes, as in Ezek. xli. 1, and 1 Kings vi. 17, it denotes only the fore part of the building, the Holy Place as distinguished from the Holy of Holies. Three great temples were erected to Jehovah during the history of the

children of Israel. (1) *Solomon's Temple*. This was erected by Solomon in conjunction with his own palace to the N. of Jerusalem on Mt. Sion. According to 1 Chron. xxviii. 11-19, the exact plan of the building was drawn by David, guided by the hand of the Lord. In front was a porch, 20 cubits in length and 10 in breadth. The entrance was supported by two brass pillars, and was probably lower than the main body of the Temple. 2 Chron. iii. 4 gives its height as 120 cubits, which should, perhaps, be reduced to 20. This led into the fore part of the building, 20 cubits by 40, and this again to the hindmost chamber, 20 cubits by 20. With the exception of the porch, the house was surrounded by an annex of side chambers in three stories, each 5 cubits in height. The number of these side rooms, in which were placed the stores and treasures of the sanctuary, is unknown. The Temple building was surrounded by the inner court (1 Kings vi. 36, vii. 12), as distinguished from the outer or great court which belonged to the royal residence. The Temple of Solomon was burnt by the command of Nebuchadnezzar on the 9th or 10th day of the fifth month of his nineteenth year, 588 B.C. (2) *The Temple of Zerubbabel*. The building of the post-exilic Temple was commenced in 536 B.C., but was soon interrupted (Ezra iii. 8). The sanctuary, in fact, restored under Darius, from 520-516 B.C. An edict of Cyrus (Ezek. vi. 3 ff.) gives the height of the Temple as 60 cubits, the breadth being the same. From the years 168-165 B.C. the Temple was turned into a heathen sanctuary, but at the close of this short period was restored to its original use. (3) *The Temple of Herod* was a magnificent restoration of the former Temple, and this last period is by far the most brilliant in the Temple history. The forty-six years over which the work was extended and the magnificent proportions of the finished work are referred to in the N.T.

Temple, a city of Texas, U.S.A., in Bell co., situated in a cotton-growing district, 35 m. S.S.W. of Waco. It was founded in 1881, and chartered as a city in 1884. Pop. (1910) 10,993.

Temple, see INNS OF COURT.

Temple, Dorothy (1627-95), the daughter of Sir Peter Osborne, married in 1655 Sir William T., the statesman. Her delightful letters to her husband were first published in Courtenay's *Biography of Temple* (1836), and were praised by Macaulay. A more complete set was issued in 1888.

Temple, Frederick, Archbishop (1821-1902), educated at Balliol Col-

lege, Oxford, where he met and formed a friendship with Dr. Jowett, Matthew Arnold, and Clough. Temple was ordained deacon in 1846, and priest in 1847. Scholastic labour now seemed to be his mission, although he undertook some Government work in London before becoming headmaster of Rugby. His friendship with Gladstone, whose Liberal views he shared, led to his being appointed to the see of Exeter, where he won for himself great popularity by his sincerity and manfulness. He was directed to the bishopric of London in 1885, and in 1896 he was nominated Archbishop of Canterbury. Among the ideals which Dr. Temple had much of heart was the cause of temperance, on which he spoke and wrote largely. He was very interested in the subject of education. He died at Lambeth Palace, Dec. 22. See *Life* by E. G. Sandford.

Temple, Henry John, see PALMERSTON.

Temple, Sir Richard (1826-1902), born at Kempsey, Worcester, and received his education at Rugby and Haileybury. He entered the Bengal civil service in 1846, and rose rapidly in it. He became lieutenant-governor of Bengal (1874-77), and then governor of Bombay (1877-80). On his return to England he sat as Conservative member for the Evesham division from 1885-92, and for the Kingston division from 1892-95. He published an autobiography in 1896.

Temple, Richard Grenville, Earl (1711-79), the brother of the premier, who succeeded Bute in 1761. He was the brother-in-law of the elder Pitt, and held office under him during the years 1758-61. He was a bitter and consistent opponent of Bute, but supported his brother's Stamp Act against the probably wiser views of Chatham.

Temple, Sir William, Bart. (1628-99), a statesman and man of letters, travelled in his youth, and in 1655 married Dorothy Osborne. He settled at Sheen in 1663, and was employed on various missions. Three years later he was created baronet, and appointed envoy at Brussels. He was largely responsible for carrying through the triple alliance formed against Spain in 1668 between England, Holland, and Sweden. He was later ambassador at the Hague, but was recalled in 1670. Four years after he returned to the Hague to arrange a marriage between Princess Mary of England and William of Orange. He was offered a secretaryship of state in 1677 and again in 1679, but declined office on both occasions. When he removed to Moor Park he engaged Swift as his secretary, and was assisted

by him in the composition of his *Memoirs*. There is a hlography by Courtenay (1836), reviewed by Macaulay in the *Edinburgh Review*.

Temple Bar was a famous gateway of London dividing Fleet Street from the Strand. When the sovereign visited the city, the custom was to ask the permission of the Lord Mayor to pass T. B. The old archway was built by Wren in 1670, but was removed in 1878 and was re-erected at Waltham Cross, Herts. It is now represented by a monument called The Temple Bar Memorial.

Templemore, a par. and market tn. of Ireland, in co. Tipperary, on the Suir, 8 m. N. of Thurles. It is supposed to owe its origin to the Templars. Pop. (1911) 2900.

Templenewsam, a tn. of W. Riding of Yorkshire, England, situated in the parishes of Leeds and Whitkirk, 3½ m. E. of Leeds. It was named from a settlement of the Templars in 1181. In 1545 Lord Darnley, husband of Mary Queen of Scots, was born here. It is the Temple Stowe of Scott's *Ivanhoe*. Pop. (1911) 2400.

Temple Society, a body of German Protestants, many of whom are settled in Palestine in agricultural colonies at Haifa, Jaffa, Sarona, etc. They expect the immediate return of Christ to judge the earth. The body was formed in Würtemberg in 1854.

Templin, a tn. of Germany in the prov. of Brandenburg, and cap. of the circle Templin, on Lake Templin, 43 m. N. of Berlin. Its ancient wall has three gates. The manufactures are agricultural machines, etc. Pop. 5670.

Temporal Power, see PAPACY.

Temps, Le, one of the leading French dailies, founded in 1861 by Nefftzer, a publicist of pronounced neo-Hegelian views, mainly with the object of furthering the interests of international trade. It was the pioneer in French journalism of the system of employing a good staff of foreign correspondents. Though literature and critiques have a place, the paper is essentially a political organ and has always been characterised by its Liberal opinions, albeit expressed in a restrained yet sound and philosophical manner. Nefftzer abandoned the direction of the T. in 1872, though he continued to collaborate with his successor. Among its most notable contributors have been Scherer (religious discussion and literary criticisms); Sainte-Beuve (literary causerie); and Brisson and Blane (publicist articles). It favours a republican form of government, and invariably condemns jingoism.

Tempsford, a par. and vil. of E.

Bedfordshire, England, on the Ouse and Ivel, 9 m. N.E. of Bedford. Pop. (1911) 500.

Temryuk, a seaport tn. of Russia, in Northern Caucasia, in the gov. of Kuban. It is situated on the Sea of Azov, and was once a Turkish fortress. There are flour mills, mineral mines, and an export trade in grain. Pop. 15,000.

Temuco, a tn. of Chile, and cap. of the prov. Cautin, 7 m. N.N.E. of Valdivia. Pop. 16,000.

Temuka, a tn. of South Island, New Zealand, in Geraldine co., 10 m. N.N.E. of Timaru. Pop. 2000.

Ten, Council of, a secret committee of the Venetian Senate, established in 1310 and vested with such a measure of executive authority as was deemed effective to cope with extraordinary crises. Its institution marked the final overthrow of the pre-existing democratic constitution, acting through a Great Council of all the citizens under a supreme magistrate, the Doge, in favour of a system of close oligarchies of hereditary aristocrats. After the defeat of Tiepolo's revolution (1310) against the growing exclusion of so many Venetians from any share in the government, the aristocratic element deemed it advisable that the Great Council, then composed almost entirely of the nobility (*q.v.*), should elect ten of its members, the Doge, his council, and the Supreme Court another ten, and that from these the Great Council should make a final selection of ten to act as a committee of public safety. When the Great Council finally became a mere electoral body and the legislative and judicial powers of the Senate were overshadowed by the C. of T., that body, though theoretically outside the constitution, became inferior in authority only to the collegio or ministers, the six ducal councillors immediately in touch with the Doge, and the Doge himself. Its numbers varied from time to time from ten to seventeen, and it was not finally abolished until 1797, the date of the fall of the republic.

Tenacity, see ELASTICITY, and STRENGTH OF MATERIALS.

Tenaille Trace, a system of fortification whereby the flanks of the fortification are practically back to back between the faces.

Tenancingo, a tn. in the state of Mexico, 45 m. S.W. of Mexico City. Pop. 10,000.

Tenant, see LANDLORD AND TENANT. Tenants in Common, see COMMON, TENANCY IN.

Tenasserim: 1. A tn. of Lower Burma on the T. riv. 2. A div. of Lower Burma, consisting of a narrow strip of land lying to the E. of the Bay

Tenerife. -- Tenerife Peak of, the highest ... Mary Is. It is also ... Teyde, and has an elevation of 12,180 ft. There are really two peaks to this mountain mass, which is a dormant

volcano, the other being Pico Chahorra, with an elevation of 9880 ft. There has not been an eruption since 1798, but volcanic disturbance has taken place in the neighbourhood as late as 1909. The peak has snow on its slopes all the year round. It is 11 m. from Orotava at the base to the summit.

Tenesmus (*τείνω*, to strain), the straining of the bowels in an unsuccessful effort at evacuation. It is a distressing symptom of certain intestinal diseases, especially of dysentery.

Tengri Khan, *see* KHAN-TENGRI.

Teng-Yuah-ting, *see* MOMIN.

Teniers, David, the Elder (1582-1649), a Flemish painter, born at Antwerp. He

Rubens and ... at Rome. He chose for his subjects familiar scenes of ordinary Flemish life. His 'Rocky Landscape,' 'The Conversation,' and 'Playing at Bowls' are in the National Gallery, London.

Teniers, David, the Younger (1610-94), a Flemish painter, the son of David T., the Elder, from whom he received his principal instruction. He was a master in the Antwerp Guild (1632-33). He was appointed court painter to Archduke Leopold and keeper of his pictures. T. painted pictures for him, many of which are now in the Imperial Gallery, Vienna, and at Munich; and he also copied other masters for him, and some of these copies are in the Wallace Collection, London. Many of his works are also in the National Gallery, among which are: 'The Money Changers,' 'The Village Fête,' 'Spring,' 'Summer,' 'Autumn,' and 'Winter.'

Tenison, Thomas (1636-1715), Archbishop of Canterbury, born at Cottenham in Cambridgeshire, and educated at the University of Norwich, and at the University of Cambridge. He was made minister of St. Andrews, Cambridge, and rector of Holywell in Huntingdonshire; and in 1680 was presented to the living of St. Martin's-in-the-Fields, London. In 1689 he was made archdeacon of London in 1691 bishop of Lincoln, and in 1694 archbishop of Canterbury. In his parish of St. Martin's-in-the-Fields he endowed a free school and founded a library.

Ten Jurisdictions, The League of, the name applied to the league formed on the death of Frederick, Count of Toggenburg (1436). It was the last of the three great leagues formed by the Swiss.

Ten Kate, Jan Jacob Lodewijk (1819-89), a Dutch author, born at

the Hague; he became pastor at Middeburg. His works are: *De Scheping* (The Creation), *De Planeten* (The Planets), and *De Jaargetijden* (The Seasons). He translated from many languages.

Tennant, Sir Charles (1823-1906), a well-known ironmaster. He became interested in politics and in 1878 was returned to Parliament as member for Glasgow, which he represented for two years. From 1880 to 1886 he was member for Peebles and Selkirk, being created a baronet in 1885. He was the grandson of the Scottish industrial chemist, Charles Tennant (1768-1838), who invented a bleaching liquor and a bleaching powder.

Tennant, Sir James Emerson (1804-69), an author and politician, born at Belfast. He became a member of Parliament for that town in 1832, and occupied later many important government posts. He was secretary to the Board of Trade (1852-67). Amongst other publications he wrote *Ceylon*, 1859.

Tennant, William (1784-1848), a Scottish scholar and poet, born at Anstruther in Fife. Handicapped from birth by being a cripple, he became clerk to a brother who was a corn factor, but the business failed and Tennant became a schoolmaster at Dunino (1812), Lasswade (1816), and Dollar (1819) successively. He studied Oriental languages and gained an extraordinary knowledge of Hebrew, Arabic, and Persian, which eventually led to his obtaining the professorship for Oriental languages at St. Andrews University. He was also a great Italian scholar, and he introduced a certain style of verse used by Italian poets in his *Anster Fair* (1812). His other works include: *The Thane of Fife*, 1822; *Papistry Stormed*, 1827, written in Scottish dialect; two plays, *Cardinal Beaton*, 1823, and *John Balliol*, 1825; besides a number of Hebrew dramas taken from Bible history.

Tennemann, Wilhelm Gottlieb (1761-1819), a learned philosopher of the school of Kant in Germany, born at Bremsbach near Erfurt. At the University of Jena in 1781 he gave himself wholly up to philosophy. At the outset of his career he was a decided opponent of the philosophy which he afterwards embraced. In 1792-95 he published in four volumes his *System der Platonischen Philosophie*. T.'s *Geschichte der Philosophie*, of which eleven volumes were completed at the time of his death (1798-1819), will remain as his surest passport to fame. He likewise translated Hume's *Treatise of Human Nature* and Locke's *Essay into German*.

Tennessee, a central southern state of N. America, having an area of 42,050 sq. m. Its boundaries on the N. are Kentucky and Virginia; on the E., N. Carolina; on the S., Georgia, Alabama, and Mississippi; and the Mississippi on the W. separating it from Arkansas and Missouri. Along the eastern boundaries rise the Unaka and Great Smoky Mts., with peaks over 6000 ft. high, whilst between these highlands and the Cumberland Plateau, the mean elevation of which is 2000 ft., is the valley of E. Tennessee, which is part of the Great Valley of the Alleghanies. The Cumberland R., an affluent of the Tennessee, waters a fertile valley W. of the Cumberland Mts. Level tracts in the W. are drained by the lower Tennessee. The state enjoys a very pleasant climate, the average annual fall of snow being 8 in. and of rain 52 in. The mean extremes of temperature are 38° F. in the winter and 78° in the summer. Over a half is still woodland, and lumbering and timbering bring in a larger revenue (30,457,000 dollars in 1909) than any other industry. Cultivated lands are dispersed over the rest, the best crop being maize (88,298,000 bushels in 1912), though conditions are quite favourable to the growth of wheat, oats, potatoes, and peanuts. Cotton, tobacco, and fruits, especially strawberries, are also cultivated. The fields of bituminous coal cover an area of 4400 sq. m., and pig-iron, copper, and phosphate rock bring in rapidly increasing incomes. The annual products from flour and grist mills are worth 29,070,000 dollars (1909), and besides foundries and blast furnaces various textile factories are now springing up. Nashville is the capital, whilst Chattanooga and Knoxville are also important. Pop. (1910) 2,184,789.

Tennessee River is the largest (950 m. long) tributary of the Ohio, U.S.A. The Holston and Clinch, which unite near Knoxville, Virginia, are the headstreams. The T. winds with a devious course through E. Tennessee, Alabama, W. Tennessee, and Kentucky, and finally reaches the Ohio at Paducah. It is navigable from the mouth to the Mussel Shoal Rapids, and again from Knoxville to a gorge some 500 m. up, known as the Snok. There is communication by railroad between the rapids and Knoxville.

Tenniel, Sir John (b. 1820), an English cartoonist and caricaturist, born in London. He is especially famous in connection with *Punch*, with which he was associated for many years. He studied for a short time at

the Royal Academy, and his first picture appeared at the exhibition of the Society of British Artists in 1836. His design for a mural decoration of the new palace of Westminster in 1845 resulted in his being commissioned to paint a fresco in the House of Lords. Meantime his reputation as a humorous artist had grown, and in 1850 Mark Lemon invited him to succeed Richard Doyle as joint cartoonist with John Leech in *Punch*, his illustrations to *Aesop's Fables* having attracted much attention. His first drawing appeared in the initial letter on p. 224, vol. xix., and his first cartoon was 'Lord Jack the Giant Killer,' representing Lord John Russell attacking Cardinal Wiseman. Some 2300 cartoons and many smaller drawings were executed by T. before he severed his connection with *Punch* in Jan. 1901. In them can be traced a political history of the period. His wonderful drawing and the originality of his conceptions coupled with his extraordinary sense of humour make him unrivalled as a cartoonist. His illustrations to Lewis Carroll's *Alice in Wonderland* and *Through the Looking-Glass* have delighted children of all ages. He was knighted in 1893.

Tennis, one of the oldest ball-games in existence, is often called royal T. or court T. to distinguish it from lawn T. It was played by the kings and aristocracy of France and England before the 14th century, and at one time became so popular in England that laws were passed prohibiting it. These were revoked by Henry VII., who played at Windsor Castle, while his son built a court at Hampton Court Palace. At the present day it has lost much of its former popularity owing to the expense of erecting and keeping up a court. Edward VII., when Prince of Wales, used to play at Prince's. Other courts are at Queen's, Lord's, Marylebone, Brighton, Oxford, and Cambridge. In 1899 the Queen's Club Championship was thrown open to all amateurs. The most recent champions are H. E. Crawley (1892-94), Sir Edward Grey (1895-96, 1898), E. H. Miles (1899-1903, 1905-6, 1909-10), Jay Gould (1907-8), and Hon. N. B. Lytton (1911-12). The courts vary slightly in dimensions, the actual floor measuring 96 ft. by 31 ft. 8 in. Round the two ends and one of the side walls run the dedans and corridor, a covered passage with a sloping wooden roof called the penthouse. Across the middle of the court is stretched a net 5 ft. high at the sides, 3 ft. in the centre. The roof of the penthouse is 7 ft. wide, and is 7 ft. 1½ in. high at the side of the

court and 10 ft. 7 in. at the further edge. The balls weigh $2\frac{1}{2}$ oz. and are $2\frac{1}{2}$ in. in diameter. The length of the racket is 2 ft. 2 in. and its weight about 16 oz. The game may be played by two or four players, and the method of scoring is the same as that used in lawn T. The winner of the toss takes the service and plays from any part of his court, striking the ball so that it goes over the net and bounces from the side penthouse into the service-court. The striker-out should then return the ball over the net at volley or after one bounce without striking the play-line or touching the roof. If a player fails to return a ball a 'chase' is made; the marker calls out 'chase four,' better than three, 'second gallery,' according to the spot on which the ball falls, the court being marked off in chases, and strokes into galleries and doors also counting as chases. If the second player afterwards makes a better chase than the first he wins the chase, but if he makes the same chase it is 'chase off,' and the score is unaffected. The winning of a chase counts one point. When two chases have been made, or one, if either player is within one stroke of a game, the players change sides. A set is the best of eleven games. Strokes are also scored by hitting the ball into the winning hazard, viz. the last gallery on the hazard side into the grille or dedans. Consult Heathcote, *Tennis, Lawn Tennis, Rackets, Fives*, 1903; Marshall and Tait, *Tennis, Rackets, and Fives*, 1890; and Eustaec Miles, *Racquets, Tennis, and Squash*, 1902.

Tennis, Lawn, see LAWN TENNIS.

Tennyson, Alfred, first Baron (1809-92), a poet, the fourth son of the Rev. Dr. George Clayton T., rector of Somersby, and a younger brother of Charles T. (afterwards Turner) (*q.v.*) and Frederick T. (*q.v.*). He was born at Somersby on Aug. 6, and in 1827 he and his brother Charles published a little volume, entitled *Poems by Two Brothers*, to which Frederick had contributed four pieces. Early in the following year he and Charles went to Trinity College, Cambridge, and there joined the famous set that included, among others, Monckton Milne, Arthur Hallam, and Thackeray.

He competed for, and won, the Chancellor's Medal for English verse in 1829, when the unpromising theme was *Timbuctoo*, and next year brought out a volume of *Poems chiefly Lyrical* that contained some charming verses, which were favourably reviewed by Leigh Hunt and others. In 1833 appeared the slim volume of poems which included *The Lady of*

Shalott, *The Lotus Eaters*, and *A Dream of Fair Women*. These, though unfavourably reviewed by the *Quarterly*, found some appreciation at the hands of the public, and T.'s work began to be known to and admired by a small circle. It was not until 1842 that T. brought out another collection of poems, which contained the cream of his earlier work, and in addition many new pieces. T.'s financial position was at this time unsound, and to make his mind easier, his friends contrived to induce Sir Robert Peel in 1845 to grant him a civil list pension of £200 a year. *The Princess* (1847) was T.'s first popular success, and this ran through five editions in six years. The favour with which this poem was received was,



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however, as nothing compared to the ebullient praise which greeted the appearance of *In Memoriam*, which was published anonymously in 1850. It was on the strength of the profits of this volume that T. brought his long engagement with Emily Sellwood to an end by marrying her on June 13, 1850. The marriage was in every way successful, and the poet used in later life to say: 'The peace of God came into my life when I married her.' In April Wordsworth died, and the office of poet-laureate was offered to Samuel Rogers, who, though he would have welcomed the offer earlier, thought that at eighty-seven he was too old to bold it. The honour was then offered to, and accepted by, T.—a very sound choice. Shortly after T. acquired a house, Farringford, near Freshwater Bay, in the Isle of Wight, which was his home for many years. *The Ode on the Death of the Duke of Wellington* appeared in 1852, and T. published nothing for three years, when came

the popular and rousing verses, *The Charge of the Light Brigade*. This was followed by *Maud, and other Poems* (1855), the exquisite *Idylls of the King* (1859), *The Holy Grail* (1869), *Locksley Hall* (1886), and *Demeter, and other Poems* (1889), which volume contained the beautiful verses, *Crossing the Bar*. His first play, *Queen Mary*, was published in 1875, and *Harold* two years later. *Becket* was printed in 1884, and nine years later was produced on the stage at the Lyceum Theatre by Sir Henry Irving, in whose repertoire henceforth it was a valuable item. T., whose health had never been robust, and who had lately suffered from illness after illness, died on Oct. 6. T.'s place in English literature is assured, although, perhaps, the time has not yet arrived when it is possible definitely to say exactly where it is. With the possible exception of Browning, it will be generally admitted that he is the poet of the Victorian era in merit. In popularity, of course, he easily distances his great rival. He had a great lyrical gift, and his best work was done in that strain. The wider public, however, has not a very keen perception of the beauty of lyrics, and by it T. is loved for *In Memoriam*, *Idyll of the King*, and for such pieces as *Charge of the Light Brigade*. It is the music of the verso that his work will survive. There are biographies by his son Hallam (1897), R. F. Horton, and Morton Luce (*Temple Primers*); and numerous studies of his works, notably . . . (1894), Churton . . . Hallam, Lord . . . been published.

Tennyson, Charles, afterwards Charles Tennyson-Turner (1808-79), a poet, the elder brother of Alfred, Lord T., with whom he was at Trinity College, Cambridge. In 1827 he and Alfred published *Poems by Two Brothers*. He wrote many exquisite sonnets, and issued collections of these in 1830, 1864, 1868, and 1873. These were collected in 1880 by his nephew Hallam. He was from 1837 vicar of Grasby, Lincolnshire.

Tennyson, Frederick (1807-98), a poet, a brother of Alfred, Lord T., contributed four poems to the *Poems by Two Brothers* (1827). His works are *The Isles of Greece* . . . *Daphne* (1891), and *Poems of and Year* (1895).

Tennyson, Hallam, second Baron (b. 1852), in his youth served as private secretary to his father, whose biography he wrote in 1897, and whose works he edited in 1908. He also collected and edited the *Sonnets of his uncle, Charles Tennyson*.

Turner. He was governor and commander-in-chief of S. Australia (1899-1902); governor-general of Australia (1902-4).

Tenor, see JOINERY.

Tenor: 1. The highest man's voice, the compass being from tenor C to treble A, i.e., an octave below soprano. It is so called because in the old plainsong the tenor-part was of sustained notes around which the harmonies were set. 2. The viola. 3. The leading bell in a peal.

Tenos, or Tinos, one of the Cyclades Archipelago, in the Aegean Sea. Its area is 79 sq. m. The chief articles of trade are wine and marble. Pop. 12,000.

Tenree, or Tailless Hedgehog, see CENTETES.

Tent, a shelter made usually of canvas, but of a flexible material, which is supported on a pole and stretched by means of cords fastened to pegs in the ground. They form the chief covering for troops undergoing practical training, but owing to their weight and the fact that they hamper an army in the field, are held in disfavour nowadays by military authorities. The modern tendency to camp out in the open has also increased the vogue of the T. Marquees are large shelters which are principle of the T., very much larger.

A kind of marquee T. is used as a hospital T. in the army nowadays, and is capable of holding eighteen beds. The circular T. is used in the British army. In the Infantry one T. assigned to every fifteen non-commissioned officers and men, and in the cavalry to every twelve. Special accommodation is made for the officers. The Ts. are 10 ft. high and have a diameter of 12½ ft.

Tent, the name given in England to a variety of Spanish wine. It is produced chiefly in the Rota district in the S. of Spain, and has a full, sweet flavour and a deep red colour, whence the name from Spanish *lino*. Owing to the low proportion of alcohol in its composition, it is often used for sacramental purposes in churches.

Tentacles, a delicate organ of touch, prehension, or defence, possessed by large numbers of invertebrates, including Cephalopods, Medusae,

. . . a fossil gastropod, regarded by some authors as a pteropod. It has a thick solid shell in the form of an elongated cone, and ranges through the Ordovician to the Devonian.

Tenterden, a municipal bor. and market tn. of Kent, England, 15 m. S.S.E. of Maidstone. Its church,

which once formed part of an Augustinian monastery, is crowned with a lofty tower. Pop. (1911) 3376.

Tenterden, Charles Abbott, first Baron (1762-1832), born at Canterbury. His father was a barber, and sent him to King's School at Canterbury. He studied the law and was admitted to the bar, and became a special pleader. He was made recorder of Oxford in 1801, and the following year published his treatise *Law relative to Merchant Ships and Seamen*. In 1816, he was puisne judge in Court of Common Pleas, and two years later was appointed Chief Justice. He was created Baron T. of Henden in 1827. He is buried in the Foundling Hospital, London. His treatise mentioned above is still an authority in mercantile law.

Tenterfield, a municipality of Clive co., New South Wales, 330 m. N.N.E. of Sydney. It is an important region, producing gold and tin. Pop. 2800.

Tenthredo, see SAW FLIES.

Tenths: 1. The tenth part of the annual profit of an ecclesiastical living which formerly went to the pope, but at the Reformation was transferred to the Crown. Afterwards various benefices were exempted from payment of T. altogether (see QUEEN ANNE'S BOUNTY AND TITHES). 2. In music, the octave of the third; an interval comprehending nine conjoint degrees, or ten sounds, diatonically divided.

Tentori, Cristoforo (1745-1810), an Italian historian, spent most of his years in Venice, and wrote not only a complete history of the Venetian republic (in 12 vols. 1785), but also a clear account (published in 1799) of the machinations to which the French had stooped in 1797 in order to compass the ruin of that republic.

Tenure is defined by the classic Williams as the relation between feudal lord and tenant of land (*Real Property*). This is sufficiently accurate because the feudal system is the foundation of modern English real property law, although the fabric of that system was effectually shattered in the early part of the 17th century. Many of the incidents of the feudal system existed in England prior to the Conquest, but the theory that all land was held mediately or immediately of the sovereign in return for either free or base services was essentially a Norman innovation adapted by the Conqueror from the continental feudalism. The only competing system of T. was the 'mark system' (which existed before the Saxon invasion), under which pasture and waste lands were held in common ownership by tribal heads of families and the arable land of the tribe

annually allotted for cultivation. This system, says Stubbs, soon gave way to one of absolute ownership (*allod*), and in any event it would have collapsed at the Conquest, though there were for long consequences of its existence in the shape of (1) communal pasturo land (Fielden mentions Port Meadow at Oxford) and (2) townships. Apparently a few old boroughs are a pure development of the mark system, and though most townships became Norman manors, it would in many modern cases be difficult to establish any royal overlordship. In return for his loan of land the feudal tenant was bound to perform either *free* or *base* services. From these services were developed respectively freehold T., and copyhold through T. in villenage. Of freehold Ts. the most honourable was that of knight service (early commuted for *scutage* or shield-money), the various incidents of which (fealty, aids, relief, wardship, marriage, primer seisin) were, however, attached to *socage* T., the T. which historically is commonly opposed to it. Most of the ancient feudal incidents were abolished by the Statute of Tenures which assimilated knight service to 'free and common socage.' The only incidents surviving are escheat, a small quit-rent, and a relief in the form of one year's rent on succession to a deceased tenant. There were also various exceptional forms of the above two cardinal divisions of T., some of which probably existed long before the Conquest. They were: (1) grand serjeanty (*q.v.*); (2) cornage (Lat. *cornu*, a horn), i.e. T. on condition of winding a horn to give warning of a hostile incursion by the Scots (these two were species of knight service, and the Dukes of Norfolk, Marlborough, and Wellington still hold lands by T. of grand serjeanty); (3) petit serjeanty (T. directly of the Crown by the service of giving some martial necessary in time of war); (4) burgage T. (*q.v.*, and BOROUGH ENGLISH), consisting now of ancient borough freeholds; (5) gavelkind (*q.v.*). These are all species of free socage T. In addition to all these, there was the eleemosynary or spiritual T. of frank-almoigne (free alms), by which religious houses held on various indeterminate conditions of spiritual services, *e.g.*, praying for the soul of the donor. Villein or base T. did not primarily constitute T. at all, as the 'tenant' had no common law estate and was a mere farming licensee. Later, when his uncertain and servile labours became commuted for a money rent, his T. developed into copyhold land (i.e., land held by *copy* of manorial

court roll). All copyholds must be part of some manor, and hence none can have come into existence after the Statute of Quia Emptores (q.v.). Manorial lands in England comprise besides copyhold land (1) manorial freehold estates in fee simple, usually held subject to quit rents, heriots (q.v.), or on other more or less archaic conditions; (2) customary 'freeholds' or copyhold tenure by the custom of ancient demesne, reputed to be ancient patrimonial possessions of the Crown (going back to the time of Edward the Confessor according to Domesday Book), which were kept in the king's own hands to provide a revenue for maintaining the royal dignity. See also DE DONIS, ENTAIL, ESCHEAT, ESTATE, FORFEITURE, LAND, LAND LAWS, and LANDLORD AND TENANT.

Teos, now Burdrum (q.v.).

Tephrosia, a genus of leguminous plants and shrubs with silky pinnate leaves and axillary racemes of white, red, or purple flowers.

Tepic: 1. A ter. of Mexico. Produces sugar, cotton, tobacco, maize, etc., in the lower regions. Area, 11,275 sq. m. Pop. 171,337. 2. The cap. of above ter., a prosperous tn. with a healthy climate. Manufs. cotton-stuffs, cloth, and cigars. Pop. 16,805.

Teplitz, Teplitz-Schönau, or Toplitz, a tn. and watering-place of Bohemia, Austria, 80 m. N.N.W. of Praguc. Manufs. machinery, metal goods, chemicals, hardware, cotton, lace, furniture, etc. There are lignite beds in the near neighbourhood, and it has famous saline-alkaline springs. Pop. 26,776.

Terai, see TARAI.

Teramo (ancient *Interamnium*), a tn. in Italy, cap. of prov. of same name. It is the seat of a bishopric, and has a fine cathedral and several churches. Chief manufs., wool, silk, straw hats, and pottery. The town consists chiefly of narrow lanes, but has one broad street with large houses. Pop. 25,000.

Terang, a tn. of Victoria, Australia, 25 m. N.W. of Warranamboul. Dairy-farming is the chief industry. Pop. 1800.

Teraphim, a word occurring fifteen times in the O.T. The T. were images of household gods, occupying the place of the Lares and the Penates among the Romans. Six times in the A.V. it is thus transliterated (especially in Jud. xvii. and xviii.), seven times it is translated 'images' (Gen. xxxi. 19, 34, 35, etc.), once it appears as 'idols' (Zech. x. 2), and once as 'idolatry' (1 Sam. xi. 23).

Teratology, the science dealing with abnormal developments of formations

of parts of the body, and with monstrosities. See DEFORMITIES, DWARF, BOTANY, VARIATION, HYBRID, GALLS, GIANT, STENOSIS, ALBINISM, MELANISM, OSSIFICATION, HERNIA, CLUB-FOOT, HARELIP, INVERSION, HERMAPHRODITES, PATHOLOGY, etc.

Terburg, or Ter Borch, Gerard (1617-81), a Dutch painter, whose subjects are generally portraits, conversations, persons engaged at different games, performers on musical instruments, ladies at their toilet; born in Zwolle. He studied in Haarlem, Italy, and France, and visited England, Germany, and Spain. One of his masterpieces, 'Peace Congress of Münster,' is in the National Gallery, London. Not only was his technique very fine, but he could depict emotion, as is evidenced by his 'Paternal Warning' hung in the Amsterdam Museum.

Terce, in Scots law, a real right whereby a widow, who has not accepted any special provision, is entitled to a life-rent (q.v.) of one-third of the heritage in which her husband died intestate (see INFESTMENT), provided the marriage has endured a year and a day and has produced a living child. See ENGLISH CURTESY.

Terceira, see AZORES.

Terebinth, or Turpentine Tree (*Pistacia terebinthus*), the small tree from which Cyprus turpentine is obtained by making incisions in the trunk.

Terebratula, a genus of brachiopods with a smooth oval convex shell. The beak is truncated and perforated, and the animal is attached by a pedicle. The species were very numerous in the Tertiary epoch, and, as in the case of other brachiopods, only a few survivors remain.

Teredo, or Ship Worm, a genus of lamellibranch molluscs with a long worm-like body clothed in a thin shelly tube or sheath. The true bivalve shell is small and occurs at the thicker end where it protects the various organs. At the more slender end are two tubes, one of which conveys water to the gills and the other expels it with excavated matter. With its sucker-like foot it bores into timber, and is very destructive to ships and piers.

Terek: 1. A Russian prov. in N. Caucasus, which includes the greater part of the basin of the Terek. It borders on the Caspian Sea. The country is remarkably fertile, and huge quantities of corn are grown, over 75 per cent. of the population adopting this industry. The orchards and vineyards of the district are numerous and very fertile. There are several health resorts in the region, which are very popular amongst the Russian natives. Gypsum ore is worked

here. Cap. Vladikavkas. Area 27,902 sq. m. Pop. 1,182,700. 2. A river of N. Caucasus. It rises to the S. of Mt. Kazbek, and flows through a mountainous district until it reaches the town of Vladikavkas. It develops at its mouth into a delta. Length 350 m.

Terence (Publius Terentius Afer) (c. 190-159 B.C.), a Roman comic poet, born at Carthage. He was the slave of a Roman senator, but received a good education from his master on account of his personal attractions as well as his literary tastes, and was soon emancipated. His first play was the *Andria*, said to have been much praised by Cæcilius, the foremost comic poet of the time, and by the publication of this he found himself introduced into the most refined and intellectual circles of Rome. He became acquainted with Scipio, Lælius, and Furius Philus, and through Scipio probably had an introduction to Polybius. He spent some time in Rome, but eventually went to Greece, where he occupied himself with translating the works of Menander, whom he took as his model. Of his works only six are extant: *Andria*, first represented in 166; *Hecyra*, 165; *Heauton Timoroumenos*, 163; *Eunuchus*, 162; *Phormio*, 162; and *Adelphi*, which was first acted at the funeral games of L. Æmilius Paulus, 160.

Terentius, Clemens, a Roman jurist, probably of the same legal school as Julianus, who flourished under the Emperor Hadrian. He wrote *Ad Leges, Libri XX.*, a treatise on the Lex Julia et Papia Poppæa.

Teresa, or Theresa, St. (1515-82), a Spanish nun, born at Avila. She entered a Carmelite convent in her native town in 1533, but seeing the relaxation of discipline within the religious orders determined on reform, and set about founding a house in which all the original rules of the Carmelite order would be observed. She met with great opposition, especially from the authorities, but having obtained permission from the pope, she established (1562) the ancient Carmelite rule at a small house in Avila which she dedicated to St. Joseph. Here the sisters (at first only four in number) lived subject to the strictest discipline: they wore sandals of rope, slept on straw, ate no meat, and were confined to the cloister to live on alms without regular endowment. After a time the number was increased to thirteen, and T. herself took up her abode with them, spending, as she says, the five happiest years of her life. She was conspicuous for her saintliness, and was subject to visions, an account of which is contained in her autobiography. Her works include: *The Way of Perfection*, *The Castle of the Soul*, and *The Book of the Foundations*, all of which have been translated by Dalton. Woodhead's translation of *The Way of Perfection*, reprinted by Waller (1902), is in the Cloister Library. See *Life* by Mrs. Cunningham-Graham, 1894.

Terrespol, a tn. and fortress of Russian Poland, in the Siedlce gov., on the l. b. of the R. Bug, opposite Brest-Litovsk. Pop. 5000.

Tergeste, see TRIESTE.

Ter Goes, see GOES.

Tergoviste, or Targuvisstea, a tn. in the prov. of Prahova, Roumania. Has historic ruins and an important arsenal. Pop. 10,000.

Terlizzi, a tn. of Apulia, Italy, 17 m. W. of Bari. Trades in wine and fruit. Pop. 23,394.

Terminable Annuities, see under PUBLIC DEBT.

Terminalia, a genus of trees and shrubs (order Combretaceæ) with racemes or spikes of white, yellow, or green flowers. Numerous species occur in tropical Asia and America.

Termini Imerese (ancient *Therma Himeracæ*), a tn. and seaport, prov. of Palermo, Sicily, founded by the Carthaginians in 407 B.C. It has a fine harbour, and trades in oil, cereals, and fish. There are hot mineral springs in the vicinity. Pop. 21,000.

Terminus, in Roman mythology, was the god of boundaries and frontiers. His worship is said to have been introduced by Numa, who instructed every one to mark the boundaries of his land with stones consecrated to Jupiter, and to offer yearly sacrifices at these stones. This festival was called Terminalia, and was celebrated on Feb. 23.

Terminus, or Term, in sculpture and architecture, a pillar statue, that is, either a half statue or bust, not placed upon, but incorporated with, and as it were immediately springing out of, the square pillar which serves as its pedestal.

Termites (Termitidæ), a family of insects (order Platyptera), characterised by the possession of biting jaws and by the absence of a metamorphosis. Ts. are the only insects other than those belonging to the Hymenoptera which are known to exist in organised communities. In their habits they resemble ants in many respects, and are often called 'white ants,' though structurally they differ from them very considerably, while their communities are differently composed. The communities consist of 'kings' and 'queens,' which are fertile males and females that have cast their wings by a rupture at a transverse suture close to the root; and of infertile males and

females whose wings never develop, and who become 'soldiers' or 'workers' according to the nature of their food. The head is large, and though many forms are blind, others have compound and simple eyes. The 'soldiers' are provided with especially large heads and powerful mandibles. The queen's abdomen becomes enormously swollen, her ovaries producing eggs at the rate of about one per second. She and the king are usually confined in the central cell in the nest, and in case of disaster to them, nymphs are always in readiness to take their place, after stimulation of their reproductive organs by special feeding. Ts. are confined to the tropical and warmer temperate regions, some species occurring in S. Europe. They feed on wood and waste substances, and construct earthen tunnels and galleries. Some of the tropical species raise vast earthen nests as much as 20 ft. high.

Terms: 1. In law the limitation of an estate or the whole time or duration of an estate, as a lease for the T. of twenty-one years, for the T. of three lives, etc. (see also LIMITATION). 2. The law T. or portions of the year during which the High Court sits. They are four in number, viz., Hilary, which usually begins about Jan. 11 and ends about the end of March; Easter, which begins in the early part of April and ends in the middle of May; Trinity, which begins towards the end of May and ends towards the end of July; and Michaelmas, which begins to the second week in October and ends just before Christmas. The 'Inns of Court' T., called by the same names as the above, are the 'dividing terms' for students, who in the process of qualifying for call to the bar fulfil the notion of residence that obtains in colleges or other places conferring degrees by eating dinners during T. time. 3. In universities and colleges the time during which instruction is regularly given to students, who are obliged by the statutes and laws of the institution to attend lectures. 4. In formal logic, the expression in language of the notion obtained in an act of apprehension. T. are divided into simple, singular, universal, common, univocal, equivocal, abstract, concrete, etc. (see also SYLLOGISM). 5. In algebra, a member of a compound quantity; as, a , in $a+b$; or ab , in $ob+cd$.

Tern, or Sea Swallow (*Sterna*), a genus of birds resembling the gulls, to which they are allied, but smaller and slenderly built and with a forked tail. They are extensively distributed, especially in temperate climates. Though poor walkers and swimmers, they are very active on

the wing, skimming the surface of the sea from sunrise to sunset in search of small fish and other marine animals. A number of species occur in Britain, the commonest of which is *S. fluvialis*, with grey plumage. The others are the sooty T. (*S. fuliginosa*), the Arctic T. (*S. macrura*), the Sandwich T. (*S. castria*). The black T. and other similar species known as marsh Ts. are now placed in the genus *Hydrochelidon*. They are distinguished by their shorter bills, short and slightly forked tails, and less fully webbed feet.

Tornate, a tn. on an island of the same name in the Malay Archipelago. Has a good harbour and is the headquarters of the Dutch residency of T. Covers an area of 25 sq. m., and has a government quay and private pier. Has no considerable trade or shipping. Its harbour possessing no bar. Pop. 3000.

Terneuzen, see NEUZEN.

Terni, a tn. in the prov. of Perugia, Italy, among the Apennines. Has important steel works and iron foundries. There are numerous interesting antiquities, and it is the birthplace of the Emperor Claudius. Near by is the famous Velino waterfall, affording water power for the iron works and factories of the town. Pop. 31,000.

Tornstrœmia, a genus of evergreen shrubs and trees (order Ternstroemiaceæ), some species of which are occasionally grown in the stove-house.

Terpander, the father of Greek music, and through it of lyric poetry. He was a native of Antissa in Lesbos, and flourished between 700 and 650 B.C. See Smyth's *Greek Melic Poets*, 1900.

Terpenes, the name given to hydrocarbons which occur in essential oils and have a molecular formula $C_{10}H_{16}$. They are all volatile, and are unsaturated compounds. The most im-

dance'), the muse of ORPHIC song; see dance. See MUSES.

Terra, or Tellus, the name under which the earth was worshipped in Rome. See GÆA.

Terrace Gardens are a series of flat walks or gardens, usually constructed where the ground slopes sharply from a house on one or more sides of it. The soil is retained by means of stone or brick walls, which themselves offer considerable scope for decorative effect. The terraces are usually made broad and laid out in beds as flower gardens, and are connected to one another by stone steps.

Terraces are level stretches of land occurring as marked interruptions of sloping ground. *River T.* occur wherever the valley has been sufficiently widened and graded to allow formation of flood-plain. On reducing the level of its flood-plain, the portions resting on the valley slopes are left as ledges which remain until weathered away; two or three of these are often traceable, and are useful in constructing the history of the river. Smaller *T.* are formed in higher courses of rivers by the washing up of material forming the banks; they are not level, but have a slight gradient towards the river. *Lake T.* are similarly formed. The age of such formations is prehistoric, and they are in consequence particularly valuable geologically, affording evidence of aquarian life and plant life on the ancient banks. Remains of animals are numerous, as the *T.* were frequented in various parts as watering-places, and many animals fell as prey. Evidences of human life and activity are also found, particularly stone implements. *Shore T.* are due to the washing up of sand, shingle, and gravel with organic remains by the storms and high tides; they are uniformly narrower. *River, lake, and shore T.* are all found in raised positions due to movements of the earth's crust, and form a valuable means of measuring those in amount and time. *Raised T.*, or beaches, as they are called, are common in Norway and Scotland, where they form striking features of the landscape; when formed by the sea they are horizontal or slightly sloping away from the water. A terrace formation occurs geologically when denuded land is formed of horizontal strata; the residual hills and mountains are flat-topped with terraced sides. This is a marked feature of the formation of the whole continent of Africa; the most remarkable instance, however, is found in the Colorado region of Western U.S.A., where the dry climate preserves the natural features. Such *T.* are also the result of past volcanic action, the levels being formed of successive flows of lava; the islands N. and W. of Scotland, and Antrim in W. Ireland, are good examples. *Cultivation T.* are commonly found in dry mountainous regions, such as Spain and Tibet; they were a marked feature in the old civilisation of Peru, and are still preserved and worked. Advantage is taken of any inequality in the mountain side, and successive generations of cultivators gradually extend the levelling; such a *T.* retains water fairly well, and the soil being virgin and continually renewed is generally of great fertility. The *Pink*

and *White T.* of New Zealand were due to the action of hot springs; the water, being highly charged with dissolved calcareous and siliceous matter, on reaching the air and cooling deposited the sinter in level terrace formation. These beautifully coloured formations were destroyed in 1886 by an earthquake.

Terracina, a maritime tn. of Italy on S. coast of prov. of Rome and 60 m. S.E. of that city. Trades in wool and cereals. It possesses the celebrated temple of Venus, thought to be the palace of Theodoric. Pop. 11,000.

Terra Cotta, baked clay used for bricks, tiles, and architectural ornaments, as well as for tombs and coffins, statues and statuettes. It may be left with its natural brown surface unglazed and uncoloured, or it may be painted as was customary among the Greeks, or it may be covered with a solid enamel of grave or brilliant colours. The Louvre, British Museum, and the museums of Berlin and Athens have remarkably fine collections of the Greek and Roman *T. Cs.*, and many provincial museums, such as those of Florence, Perugia, Rome, Naples, Nîmes, and Arles, have also collections of importance. The best collections of Greek *T. C.* figures are in the British Museum, the Louvre, and the museums of Berlin and Athens. In the Victoria and Albert Museum there is a remarkable collection of fine Florentine *T. Cs.* of the best periods. In parts of Italy the architecture of the later Gothic style and of the early Renaissance is marked by a free use of *T. C.* In the 19th century its use was largely revived, and it has been employed in England for architectural work (e.g. Natural History Museum at S. Kensington, as well as in other large towns), being especially suitable as a building material because of its capability of resisting the acids and soot contained in the atmosphere. See *Murray's Handbook of Greece*, Anderson and *Structure of Greece and Ancient Pottery, Art of the Gr Museum Catalog* 1903.

Terra del Fuego, see **TIERRA DEL FUEGO**.

Terra di Lavoro, see **CASERTA**.

Terra-firma, a term used to denote main or continental land as opposed to insular. The name was particularly used in the middle ages for that part of the Italian mainland which was subject to Venice.

Terra Japonica, see **CATECHU**.

Terranova, a seaport on the S.

coast of Sicily. It was founded at the end of the 13th century on the site of the ancient Gela. Manufs. coarse cotton and woollen goods, and has fisheries of tunny and sardines. Exports wine, grain, sulphur, and soda. Pop. 22,000.

Terrapin, a name given to various tortoises of the family Emydidae, some of which are highly valued as food. Among the most important are the yellow-bellied, the red-bellied, the chicken, and the salt-water Ts. They are all active swimmers, their clawed digits being united by a web. They are almost omnivorous, but feed chiefly on aquatic animals. In America and Australia they are commonly kept and fattened in captivity.

Terra Rossa, a ferruginous red earth which occurs in the limestone district of Dalmatia, and is the result of sub-aerial disintegration.

Terre Haute, a city of Indiana, U.S.A., co. seat of Vigo co., on Wabash R., 68 m. W.S.W. of Indianapolis. Has foundries and manufs. iron goods, cars, clothing, glass, etc. There is a state normal school and polytechnic engineering institute. The town is situated on high ground, and has wide, well-paved streets. Pop. (1910) 58,157.

Terrell, a city of Texas, U.S.A., Kaufman co., 30 m. E. of Dallas. Cotton is the chief manuf. Pop. (1910) 7050.

Terre-Noire, a tn. in dept. of Loire, France, 1 m. N.E. of St. Etienne. Has steel works of considerable importance. Pop. 5200.

Terrestrial Magnetism, see MAGNETISM, TERRESTRIAL.

Terrien de la Couperie, Albert (1845-94), a philologist, born in Ingville (Le Havre), but ultimately came to London and became a naturalised Englishman. He made a special study of ancient inscriptions and Chinese characters, and made a catalogue of the Chinese coins in the British Museum. He wrote: *The Oldest Book of the Chinese; Early History of Chinese Civilisation; On the History of the Archaic Chinese Writings and Text; and The Languages of China before the Chinese*. He was for a time professor of comparative philology at University College, London.

Terrier, a term originally applied to dogs which pursue rabbits and other game into their burrows, but now applied to a number of breeds most of which are too large and some too pampered to justify their name. The best known are the Smooth and Wire-haired Fox T., the Scotch or Aberdeen T., the White West Highland T., the Dandy Dinmont, the Bedlington, the Airedale T., the

Irish T., the Welsh T., the Sealyham T., the Bull T., the White English T., the Black and Tan T., the Yorkshire T., Skye T., and the Clydesdale T.

Terriss, William, originally William Charles James Lewin (1847-97), an actor, after serving for a short time in the merchant service, went on to the provincial stage in 1867, and soon came to London, where his breezy style secured him a leading position. His best parts were *Squire Thornhill* in *Olivia* and *William* in *Black-eyed Susan*. He was assassinated at the stage door of the Adelphi Theatre, where he played leading parts, by an unsuccessful actor. There is a biography by Arthur Smythe, 1898.

Territorial Force. In 1907, by means of the Territorial and Reserve Force Act, Lord Haldane attempted to establish a voluntary army for the defence of Great Britain and Ireland, which being in itself a complete army would suffice for the defence of the home country and would permit of the employment of all our regular

soldiers abroad. The scheme was originally voluntary and the being chemically territorial

sohome was very much higher than that of the old volunteer system. The territorials formed in themselves a 'complete self-contained army.' The terms of service were enlistment for four years with the option of re-engagement at the close of that period, a certain definite number of

men about numbers ok to men

need not attend the same drills at the same time, and that, therefore, complete company drill is often impossible. Annual camp training, which is compulsory, save in a few exceptional circumstances, amount to between eight to fifteen days, and this annual training always takes place at the same time, usually during the early part of August. During 1909-10 great efforts were made to bring the T. Force up to its full complement of numbers.

The force gained a considerable number of recruits, but the numbers again fell away and another great effort was made in April 1912. This attempt was, on the whole, not quite so successful, but did much to show the necessity for constant recruiting. The T. F. is made up in the following way: of yeomanry, horse and field artillery, garrison artillery, engineers,

infantry, and cyclist corps, and certain other departmental troops. The establishment of men and officers is 315,984, and the actual numbers on April 1, 1912, were 9382 officers and 269,173 men. There is still at the present time (1913) a shortage of over 50,000 officers and men. The force is enlisted for service at home only, but volunteers may be called for in case of active service for service abroad, and the question of willingness to serve abroad is usually put to the territorial when he enlists. County associations have been formed in order to administer the Act and to supervise the finance and buildings of the territorials. Associated closely with the territorials are the officers' training corps and cadet corps. Some schemes have been put forward since the first organisation of the territorials in order to make the scheme more feasible as far as drills and camps are concerned. The most wide-reaching probably was the grant of a separation allowance to married territorials who remained in camp for fifteen days. The question of the supply of horses was one of the greatest problems of the county associations, and this has been solved partially by a system of 'horse letting' which the War Office and the county associations have now taken up. A T. F. Reserve has been formed, but has appealed so far more to the officers than to the men.

Territorial Waters. Most modern states recognise the sovereignty of every other state over its own marginal waters. The limit is generally fixed at one marine league from the shore measured from low-water mark. This distance of permissible appropriation is the subject of much criticism by writers on international law, because it was in its origin suggested by the supposed range of a gun; the tremendous range of modern artillery has made the distance meaningless (see on this Hall, *International Law*). The acquittal for want of jurisdiction of a German prisoner charged at the Central Criminal Court with manslaughter through the running down of the *Strathclyde* by the *Franconia* (in the famous trial of Reg. v. Keyn. 1876) two miles off Dover led to the passing of the Territorial Waters Jurisdiction Act, 1878. By that Act the English courts have jurisdiction to arrest and try persons, whether British subjects or not, for offences committed on the high seas within the T. W. of the Crown, i.e., within one marine league from the coast.

Terror, Reign of, see FRANCE—History.

Terry Family, English actors and actresses. *Benjamin Terry* (1818-92)

and his wife were well-known provincial actors, although in their later years they also had engagements in London with Maerady and Charles Kean. Their daughter *Kate Terry* (b. 1844), the eldest of the family, made her first appearance on the stage in 1850, and the next year came to London and was engaged by Charles Kean. She played Robin in *The Merry Wives of Windsor* and Prince Arthur in *King John*, in which part she was much praised by Macaulay. She subsequently appeared as Cordelia, Ophelia, Ariel, Juliet, Viola, all of which she played with remarkable success, but especially made a great hit in 1862 by her part of Mrs. Union in *Friends or Foes*. Other famous impersonations were as Monec in *Up at the Hills*, Blanche de Nevers in *The Duke's Mollie*, and Mary Leigh in Boucicault's *Hunted Down*, and she also made the part of Alice in *A Sister's Penance*. She retired from the stage on her marriage, but reappeared in 1898 in *The Master*, produced by Mr. John Hare at the Globe. *Ellen Terry* was born in 1848, and made her first appearance as the boy in *Tale in*

ment. In 1867 she first played with Irving, taking the part of Katharina to his Petruchio in *The Taming of the Shrew*, and in 1875 scored a great success as Portia in *The Merchant of Venice*, which was revived at the Prince of Wales's Theatre under the management of the Bancrofts. She also won great praise for her impersonation of Olivia in Goldsmith's *Vicar of Wakefield* in 1878, and the same year was engaged by Irving as leading lady at the Lyceum, subsequently appearing as Ophelia, Portia, Desdemona, Juliet, Beatrice, Viola, Lady Macbeth, Katharine in *Henry VIII.*, Cordelia, Imogen, and Volumentia in *Coriolanus*. She also played the title-part in *Nance Oldfield* in 1893, Rosamund in *Becket* in 1893, and Clarisse in *Robespierre* in 1899, and appeared with Mrs. Kendal in Tree's revival of *The Merry Wives of Windsor* in 1902. Her stage jubilee was celebrated in 1906. See *The Story of my Life*, 1908. Her sister *Marion Terry* (b. 1856) has also won a great reputation as an actress, notably in *Lady Windermere's Fan*, in which she re-appeared in 1911 at St. James's Theatre. *Florence Terry* (d. 1896) played in *The Iron Chest* with Irving, and was the original Little Nell of Halliday's play. *Fred Terry* (b. 1865) first appeared on the stage in 1880 under the Bancrofts. He is well known with his wife, Julia Neilson, as an actor-manager, and has played with her in *Sweet Nell of*

Old Drury, Hypatia, As You Like It, The Scarlet Pimpernel, Henry of Navarre, etc. His daughter *Phyllis* has already made a name as an actress in Shakespearian plays. Other members of the T. F. on the stage are: *Beatrice Terry*, daughter of Charles and niece of Ellen and Fred, who played Suzanne in the *Scarlet Pimpernel* in 1910 and Marie in *Henry of Navarre* the same year, and has since toured with her uncle Fred T. *Minnie Terry*, eldest daughter of Charles, appeared in 1911 as Dora in *Fanny's First Play*.

Terschelling, an island in the North Sea, off the Netherlands, 16 m. long and 3 m. broad. Pop. 3996.

Tertian Fever, see MALARIA.

Tertiaries (*Tertius ordo de pœnitentia*), associations of men and women living in the world but connected with certain religious orders, who practise the religious life as much as their state will allow. Such associations were first regularly formed by St. Francis of Assisi, and they have since produced much fruit. Previously he had founded two orders—the Friars Minor and the Poor Clares. Hence the name 'Third Order.'

Tertiary, in geology, a system which includes all the sedimentary accumulations formed between the close of Cretaceous time and the beginning of the Glacial Period. The system is divided into four groups, viz. Eocene, Oligocene, Miocene, and Pliocene, according to the percentages of recent mollusca contained. The strata of the system are of great lithological variety, and are found in the structure of all the continents and their great mountain chains. The Alps, Himalayas, Atlas, Carpathians, and Cordillera were formed in T. time. The T. crust movement was accompanied by

upon his conversion he was ordained a presbyter, though where we are not told. He himself speaks of having been at Rome, and we know that he could write Greek. His conversion probably took place about 190. About the end of the 2nd century he became a Montanist. Jerome ascribes this change to his suffering from the envy and insults of the clergy of the Roman Church, but a more adequate and more probable reason for it is to be found in the character of T. himself. T. holds one of the first places, if not the very first, among the Latin fathers for learning and intellectual power. His writings are apologetic, practical, and doctrinal. The best edition is that in the Vienna *Corpus Scriptorum Ecclesiasticorum Latinorum*, vol. xx. (1890). See also any works on Early Church History.

Teruel: 1. A prov. of N.E. Spain, covering an area of 5720 sq. m. It is extremely mountainous, the highest point being Mt. Javalambre, in the S. (6568 ft.). It has several large rivers, the principal being the Tagus, Guadalquivar, and Guadaloupe. Chief products, corn, oil, wine, fruits, timber, etc.; and industries agriculture, mining, and weaving. Pop. 255,408.

2. Cap. of above prov., situated on the l. b. of the Guadalquivar. Has a cathedral dating from the 16th century, and some fine churches, and is the seat of a bishopric. Pop. 11,000.

Teschen, a tn. of Silesia, Austria, 50 m. S.E. of Treppan, on the R. Olsa. Peace was made here in 1779 between Austria and Prussia. It has furniture factories and saw-mills, and manufactures cloth, linen, spirits, etc. It is an old town, and has the remains of an ancient castle dating from the 12th century. Pop. 22,538.

Teshan, a tn. of Banaluka circle, Bosnia, Austria, 62 m. from Sarajevo, with an active trade. Pop. 7000.

Tesla, Nikola (b. 1857), an electrician and co-worker with Edison; of Serbian origin he emigrated to America in 1882. He is chiefly noted for the Tesla coil; this is of low self-induction, but produces a rapid alternating oscillatory current capable of long distance transmission. It induces luminosity in a Tesla tube placed near. The currents have been experimented with for the cure of lupus.

Tesla Coil, see TESLA, NIKOLA.

Tessera, or Tessela, a small cube or square resembling dice, and consisting of different materials, as marble, precious stones, ivory, glass, wood, or mother of pearl. These tesserae or tessellæ were used to form the mosaic pavements in houses.

Tessin. There are three eminent

was at first warm and moist, and gradually became colder and colder, and culminated in the glacial periods of the Pleistocene. See EOCENE.

Quintus

(c. 160-180)

ecclesiastical writers. He early embraced the

profession of an advocate or rhetorician, in which he appears to have attained to some eminence. In all probability it was at Carthage that he was converted to Christianity, and

Swedes of this name, father, son, and grandson :

Nicodemus Valentinsson Tessin (1619-88), born at Stralsund, held the appointment of royal or crown architect. One of his chief works is the palace of Drottningholm, begun by him for the queen-dowager Hedwig Elconora (widow of Charles Gustavus), but completed by his son. He also erected the royal villa of Strömsholm, and the mausoleum of Charles Gustavus.

Count Nicodemus Tessin (1654-1728), son of the above, was born at Nyköping. He was educated first at Stockholm, afterwards at Upsala, and then studied architecture at Rome under Bernini. He visited Naples, Sicily, and Malta, and returned to Rome, at which place he received from Sweden his appointment as court-architect in 1689. The destruction of the royal palace by fire in 1697 afforded him an opportunity to render the new edifice one of the noblest of its kind in Europe. He took a considerable share in public and political affairs.

Count Charles Gustavus Tessin (1695-1771), the son of Count Nicodemus, was born at Stockholm; a statesman and diplomatist. He was ambassador at the court of France from 1739-42 and president of the chancery from 1747-52. He first established the Swedish Academy for Painting and Sculpture in 1735.

Tessin, see TICINO.

Testacella, a genus of slugs characterised by a small external ear-shaped shell at the tail end of the foot. It is not slimy, and lives underground, feeding at night time on earth worms and grubs.

Test Acts: 1. By the Test Act, 1673, all officers, civil and military, were obliged within six months after appointment to make a declaration against transubstantiation, take the sacrament in accordance with the ceremony of the English Church, and to take the oath of supremacy (*q.v.*). This Act was usually conjoined with the Corporation Act, 1661, which compelled all holders of municipal offices to take the sacrament—a provision aimed at the Presbyterians. Lord John Russell in 1828 carried a motion for their repeal. 2. The Parliamentary Test Act of 1678, which was passed after the perjured evidence of Titus Oates, and is now repealed, prohibited Roman Catholics from sitting in Parliament.

Testament, see BIBLE, NEW TESTAMENT.

Testament, see WILL.

Testamentum Domini, a book of church order of the 5th century, belonging to the same class of writings as the Apostolic Constitutions. It

was originally written in Greek, but is extant only in Arabic and Syriac, in which versions it occurs as the first volume of the Clementine oetateuch. A complete edition was published in 1899 by I. E. Rahmani, Patriarch of Antioch (at Mainz), and there is an English translation by J. Cooper and A. J. Maclean (1902).

Testelin (or *Tettelin*), Louis (1615-55), a French painter, executed an historical portrait of Louis XIV., but his finest pictures are the 'Resurrection of Tabitha' and the 'Scourging of Paul,' both in the Church of Notre Dame, Paris.

Testimony, see PERPETUATION OF TESTIMONY.

Testing Clause, in Scots law, the technical name for the clause in written deed or other formal legal instrument which authenticates the document according to the forms of law. It contains the name and designation of the writer of the instrument, a record of the number of folios of which it consists, and the names and designations of the witnesses to the writer's signature.

Testing, Electric, see ELECTRICITY.

Test-papers are paper slips impregnated with some chemical reagent. Litmus papers are used for testing for acids and alkalis, acids turning the blue variety to a red colour and alkalis turning the red papers to a blue. Paper containing lead acetate is used as a test for hydrogen sulphide, which turns it brown. Oxidising agents, such as chlorine, ozone, etc., are tested for with papers containing potassium iodide and starch, which are turned blue in their presence. Turmeric paper, which is yellow in colour, is used as a test for alkalis and boric acid, which cause it to become brown.

Testudinaria, or *Elephant's Foot*, a genus of deciduous climbing plants (order Dioscoreaceæ), sometimes grown in the greenhouse. *T. elephantipes* forms a huge fleshy root-stock much of which is above ground, and from it issue stems of great length bearing small greenish-yellow flowers. The roots are sometimes eaten by the Hottentots.

Testudo, the technical name applied to a Roman military formation which was used when attacking fortified positions. The soldiers who were attacking raised their shields well above their heads and interlocked them. They were thus able to approach the fortified position with little danger of being badly injured by missiles dropped from above.

Testudo, see TORTOISES.

Tetanus, or *Lockjaw* (from Gk. *τετανος*, to stretch), an infectious

disease characterised by violent muscular contractions. The cause of the disease is the introduction into a wound of the *Bacillus Tetani*. The existence of this micro-organism was demonstrated by Nicolaier in 1855, but a pure culture of it was first obtained by the Japanese scientist, Kitasato, in 1889. The germs are not themselves carried away in the blood-stream, but they set free toxins or poisons of unparalleled virulence, ²⁵⁰⁰⁰⁰⁰ of a drop of a cultivated example having been known to kill a mouse. The toxin acts upon the cells of the central nervous system, and the voluntary muscles are very quickly out of the control of the sufferer. The bacillus of T. is found in soil, animal excrement, etc., and it obtains an entrance to the body through a wound which has become contaminated with dirt. There is no truth in the supposition that wounds in the thumb are particularly liable to set up tetanus. The duty of cleaning a wound which has come into contact with soil should never be neglected, as the development of the injurious toxin proceeds with fatal rapidity. The first sign of the disease is a feeling of stiffness at the back of the neck; the muscles of the jaw are then affected, with the result that the mouth is opened with difficulty, and afterwards becomes closely shut. The stiffening of the muscles proceeds to the body and limbs, until parts of the body become absolutely rigid to the touch. Besides the constant rigidity, there occur convulsions at intervals which may be as short as ten minutes. The muscles are then contracted with such violence that they may become ruptured or lead to the fracture of a bone. The absence of complete relaxation serves to distinguish lockjaw from the spasms associated with strychnine poisoning. The treatment of T. should commence with an effort to make the wound surgically clean. Morphia or chloroform should be used to lessen the pain caused by the spasms. T. antitoxin has been found useful as a prophylactic, but when a patient has been demonstrably attacked the development of the toxin has usually proceeded too far for any injection-treatment to be of avail.

Tetbury, a tn. of Gloucestershire, England, 10 m. S.W. of Cirencester, and 8 m. S.S.E. of Stroud. Trades in agriculture. Pop. (1911) 1758.

Tete, or Tette, a tn. of Portuguese E. Africa, on the Zambesi. Formerly of some commercial importance, its trade has now somewhat declined. It is 110 m. from Blantyre, and on the route of the telegraph line connecting that town with Salisbury.

Tête de Pont, a technical term in

fortification meaning bridge head. It is used to defend the entrance to a bridge.

Tethys (Τηθύς), in Greek mythology, was the daughter of Uranus and Gaea, and the wife of Oceanus, by whom she was the mother of the Oceanides and the river-gods. She was also the instructress of Hera.

Teton, a mountain range of the Rocky Mts., in Wyoming, U.S.A. The highest peaks are Grand Teton (13,747 ft.) and Mt. Hayden (13,691 ft.).

Tetrabelodon, *see* MÖRTHERITUM.

Tetrachord, *see* HARMONY.

Tetradynamous, a botanical term applied to stamens which, as in the Cruciferae, vary in length within the same flower, four being long and two short.

Tetragoniaceae, a natural order of succulent plants and small shrubs. The best known species is *Tetragonia expansa*, the New Zealand spinach (q.v.).

Tetragonolobus Edulis, or Winged Pea, a Sicilian plant with quadrangular winged legumes which have been used as food.

Tetrahedron, *see* POLYHEDRON.

Tetranthera, a genus of small trees (order Lauraceae) with feather-veined leaves and umbels of small white and yellow flowers.

Tetrao, *see* BLACKCOCK, CAPERCAILLIE, and GROUSE.

Tetrarch, the ruler over the fourth part of a country. The term was borrowed by the Romans from the Greeks, with whom, however, it had quite a different meaning. On the death of Herod the Great, his dominions were divided among Archelaus, Herod Antipas, and Herod Philip. Part remained under the direct rule of a Roman procurator.

Tetricus, Caius Pesuvius, the last of the pretenders who ruled Gaul during its separation from the empire. He reigned from 267 to 274 A.D., when he was defeated by Aurelian at Chalons.

Tetrodon, a genus of fishes, the teeth of which coalesce into upper and lower beaks divided by a median suture. A considerable number of species occur in tropical and subtropical seas, and one, *T. lagocephalus*, has been taken off British coasts.

Tetschen, a tn. of Bohemia, Austria, 83 m. N.N.E. of Prague, on the r. b. of the Elbe. Manufs. chemicals, soap, cotton, flour, beer, etc. Pop. 10,641.

Tetuan, a seaport of Morocco, on the Mediterranean, 40 m. S.E. by E. of Tangier, and a few miles S. of the Strait of Gibraltar. The tn. is well fortified, surrounded by walls and a citadel. The chief industries are tile works, inlaying, and the manuf. of

yellow slippers, and it exports fruit and grain. Pop. about 25,000.

Tetzel, John (c. 1455-1519), a Dominican monk, who by the scandalous manner in which he carried on the traffic in indulgences roused Luther to precipitate the Reformation. This occurred in 1517. See *Lives* by Korner (1880) and Hermann (2nd ed. 1883).

Teucer (Τεύκρος): 1. Son of the river-god Seamander and the nymph Idæa, was the first king of Troy. The Trojans are sometimes called 'Teneri' after him. 2. Son of Telamon and step-brother of Ajax. He was celebrated for his archery among the Greeks.

Teucris, see **TEUCER** and **TROY**.

Teucrium, a genus of mostly perennial plants (order Labiatæ). The three British species are *T. botrys* (an annual), *T. scordium*, water germander, and *T. scordonia*, the wood germander or wood sage, a common bitter plant which has been used as a substitute for hops.

Teuffel, Wilhelm Sigismund (1820-78), a German classical scholar, born at Ludwigsburg. He was appointed professor in the University of Tübingen in 1857, and held the post till his death. His *magnum opus* was *Geschichte der Römischen Literatur*, 5th ed. 1890, English trans. by Warr, 1900.

Teutoburger-Wald, a range of hills in N.W. Germany extending along the borders of Hanover and Westphalia and through Lippe. The greater part of the chain is densely wooded. Mt. Barnackow, in Lippe, is the highest peak (1490 ft.).

Teutones, a tribe of northern Europe which in the time of Pytheas inhabited the coasts of the northern ocean. They became known to the Romans in 103 B.C., and the following year were defeated, with the Ambrones, at Aquæ Sextiæ by Marius.

Teutonic Knights, one of the great semi-religious orders of knights founded during the period of the crusades. The order originated in a brotherhood formed by certain German merchants of Bremen and Lübeck during the siege of Acre in 1190. A hospital was started, and thence came the foundation of the Teutonic Knights of the Hospital of St. Mary of Jerusalem. The new order, distinguished by a white mantle with a black cross, was formed on the model of the Knights Hospitallers, and its members were also pledged to tend the sick, to protect the church, and to wage war against the heathen. In 1198 the hospital was turned into an order of knighthood, and in 1237 it absorbed the order of the Brethren of the Sword.

The Teutonic Knights conquered Lithuania and the Baltic regions of Prussia during the 13th and 14th centuries. Their defeat at the hands of the Poles and Lithuanians at Tannenberg struck a great blow at their prestige and the order declined rapidly. In 1525 the 'high master,' Albert of Brandenburg, was converted to Protestantism, and the order was secularised. Thus it continued till its suppression by Napoleon in 1809.

Teverone River (Italy), see **ANIO**.

Teviot, a riv. in Roxburghshire, Scotland, rising in the S.W. and following a N.E. course of about 40 m., joining the Tweed at Kelso. Has good salmon and trout fishing.

Teviotdale, the name given to that part of Roxburghshire drained by the Teviot and its tributaries.

Tewfik Pasha, Mohammed (1852-92), Khedive of Egypt. He was the eldest son of Ismail Pasha, and succeeded him in 1879. At that time Egyptian finances were under Anglo-French control, and the country was in a great state of unrest politically. In 1882 the rebellion of Ahrabi Pasha occurred which resulted in a British Protectorate being established and put an end to French influence. The revolt of the Mahdists in 1884-85 led to the loss of the Sudan and Upper Nile in spite of the British expeditions. T. had only one wife, Anima Hanem, whom he married in 1873.

Tewkesbury, a municipal and market tn. in Gloucestershire, England. It is situated on the Avon just where it is joined by the Severn, and is 10 m. N.E. of Gloucester. The abbey church dates from the 12th century (1125) and is a very beautiful building. It possesses a massive tower, and has a number of radiating choir chapels in the Decorated style, and a curious W. front, with an immense archway and window and a recessed porch. The interior contains some interesting monuments and some fine old glass. Ruins are all that remain of the great Benedictine abbey that once flourished here and dated back to Saxon times (c. 715). The town contains many other old buildings, including the grammar school, almshouses, etc. T. occupies the site of a Roman encampment, and in 1087 it was a borough and market. It received charters in the reigns of Edward III., Elizabeth, and William III. It was the scene of a battle during the Wars of the Roses, when the Yorkists under Edward IV. defeated the Lancastrians under Margaret of Anjou, and the former was established on the throne (May 1471). Pop. (1911) 5287.

Texarkana, the name given to two cities which are adjacent, one being

the co. seat of Miller co., Arkansas, U.S.A., and the other of Bowie co., Texas. The chief articles of trade are lumber, cotton, cotton-seed, and oil, while machinery, furniture, and railway engines are the chief manufs. Pop. (1910), T. in Texas, 9790; T. in Arkansas, 5055.

Texas, the largest (265,896 sq. m. in area) of the United States of N. America, and lies in the extreme S.W., with a coast-line along the Gulf of Mexico, stretching for 370 m. from Mexico N.E. to Louisiana. The general slope is N.W. to S.E. The 'Llano Estacado' is a barren plateau in the W., with a mean elevation of from 3000-5000 ft. The descent to 1000 ft. is swift, and then come the fertile tracts of rolling prairie, with plentiful forests of yellow pine in the E., and with fat pastures alternating with rich corn lands—tracts which extend terracewise to the fertile lowlands and barren swamps of the coastal belt. Behind Padre Is., which hugs the shore for over 100 m. northward from the mouth of the Rio Grande to that of the Nueces, is a region of white sands, known as 'the desert.' Sand bars block most of the harbours. With the exception of the Red and Arkansas, which carry their waters eastward to the Mississippi, all the rivers, including the Brazos, Colorado, and Trinity, drain southward to the Gulf of Mexico. T. is one of the great granaries of the world; maize is a long way the first crop, and after that come oats, wheat, and rice. Cotton, tobacco, peaches, and sugar (in the Brazos delta) are also grown. Stock-raising is of vital importance, there being 3,000,000 swine, 2,000,000 sheep, over 1,000,000 horses, and the same number of milk cows. Petroleum is the most valuable mineral product, but the outputs of clay, coal, and Portland cement are also considerable. Slaughter-houses and meat-packing stores, and after them flour and grist mills, are the most profitable industrial establishments. But lumbering and timbering and the manufacture of cotton-seed oil and cake are very thriving industries, whilst iron founding and the making of machinery and cars as well as rice cleaning are each year giving employment to more hands. The state is too vast to enjoy a uniform climate. The 'northers,' or biting hurricanes, however, which suddenly spring up and lower the temperature perhaps 20° for as long as three days, are a striking feature. Moreover, the air in the W. is remarkable for its dryness. The capital is Austin, but San Antonio (98,614 inhabitants in 1910), Dallas, Houston, Fort Worth, El Paso, and Galveston are

all larger. T. was associated with Mexico till 1836, and after ten years' independence joined the American Union in 1845. Pop. (1910) 3,896,542. See D. G. Wooten (editor), *A Comprehensive History of Texas*, 1685-1897 (2 vols.), 1898; F. W. Simonds, *The Geography of Texas*, 1905; G. P. Garrison, *Texas*, 1903.

Texeira, Joseph (1543-1604), a Portuguese historian, born in Lisbon. Having been admitted into the Dominican Order he became, in 1578, prior of the convent of Santarem. He supported the pretender Don Antonio against Philip II., and on his defeat accompanied him to France and afterwards to England. He wrote *Flammula seu vexillo Sancti Dionysii; De Portugallia Ortu; Exegesis genealogica*.

Texel, one of the W. Frisian Is., belonging to Holland. It is situated at the mouth of the Zuider Zee to the N. of Helder, from which it is separated by a channel 2 m. wide, and has an area of 71 sq. m. The northern end is called Elerland, or 'island of eggs,' in reference to the large number of sea-birds' eggs which are found there. It was joined to T. by a sand-dike in 1630, and is now undistinguishable from the main island. The island is a great fishing centre for small herring, flat fish, anchovies, and shrimps, and produces fine breeds of sheep and cattle. Other industries are agriculture and boat-building. Off T. the English fleet under Monk defeated the Dutch under Van Tromp, who was killed in the action, 1653. Pop. 6255.

Textiles, see FABRICS, TEXTILE.

Teynham, a vil. of Kent, England, noted for its orchards. There are also cement works here. Pop. (1911) 1800.

Tezcuco, or Texcoco, a tn. in Mexico, situated near the Lake of Texcoco and 16 m. E. of Mexico. It is an old city and was originally the centre of the Aztec culture, some of its old buildings still remaining. It has now railway works and manufs. glass. Pop. 16,000.

Tezuatlan, a tn. in the state of Puebla, Mexico, 72 m. N.E. of Puebla. Pop. 11,000.

Thaba N'Chu, a tn. in the Orange Free State, S. Africa, 36 m. from Bloemfontein.

Thackeray, Anne Isabella, see RRTCHIE, LADY.

Thackeray, William Makepeace (1811-63), a novelist, born at Calcutta and sent to England in 1817. He was educated at the Charterhouse, London, and at Trinity College, Cambridge. He entered the Middle Temple in 1831, but did not pursue his legal studies. From childhood he had scribbled verses and made rough

drawings, in all of which his humour was apparent, and in 1833 he purchased and edited *The National Standard*, a weekly paper that was unsuccessful. Having spent his patrimony he now went to Paris to study art, and in 1836 published the amusing sketches *Flore et Zéphyr*, and became Paris correspondent of the daily newspaper, the *Constitutionnel*. When that paper died in 1837, he, having in the previous year married Isabella, daughter of Colonel Shawe, came to England and wrote for *Fraser's Magazine* and many other

in monthly parts (1847-48). This and *Pendennis* (1848-50) placed him in the front rank of living novelists. He lectured in London and the provinces on *The English Humorists of the Eighteenth Century* in 1851, and went to America to deliver the lectures there shortly after *Esmond* was written (1852). *The Newcomes* was published 1853-55, and while it was coming out *The Rose and the Ring*, a delightful extravaganza, appeared (1854). T. lectured on *The Four Georges* in America and England in 1855 and 1856, and in the following year unsuccessfully contested Oxford in the Liberal interest. *The Virginians* came out in 1857-59, and in 1860 T. became first editor of the *Cornhill Magazine*, to which he contributed *Lovel the Widower* (1860), *The Adventures of Philip* (1861-62), and the delightful *Roundabout Papers* (1860-63). He resigned the editorship in 1862. At the time of his death, Christmas Eve, he was engaged upon *Denis Dural*, the fragment of which has been published (1864). T. is the lineal literary descendant of Henry Fielding, and is by many thought only to be second to him as an English novelist. His plots were often indifferent, except in the case of *Esmond*, the plan of which was carefully prepared, but his humour and satire are excellent, and his gift of characterisation and his knowledge of life give virility to all his writings. His best works are *Vanity Fair*, *Pendennis*, *Esmond*, and *Barry Lyndon*, while the *Roundabout Papers* are in their way inimitable, and his light verse at its best is of remarkable quality. T. illustrated most of his own writings, and though it is urged that he lacked distinction as an artist, no one disputes that as an illustrator he was other than successful. There was a delicious quaintness about his sketches, that for humour rival those of Cruikshank and Leech. There are numerous collected editions of his works. The first (22 vols.) appeared in 1867-69. His daughter, Lady Ritchie, issued a biographical edition (13 vols.), 1898-99, and this, with additions, was reprinted as the Centenary Edition (26 vols.) in 1911. The most complete edition, with all the original illustrations, is that of Lewis Melville (20 vols.), 1901-7. There is a monograph on T. in the Great Writers series by Herman Merivale and Sir Frank T. Mazials (1879), and a fuller biography by Lewis Melville (1899; 5th and much enlarged ed., with an elaborate introduction, 1900). A valuable edition by Mudge and Thaddæus, see JUDAS.



THACKERAY

periodicals. The *Fel ouplush Correspondence* appeared in *Fraser* (1837-38). His married life came to a close in 1810, owing to his wife's insanity. In that year he published *The Paris Sketch-book*, and this was followed by *Comic Tales and Sketches* (1841) and *The Irish Sketch-book* (1843). There had already appeared serially *The Great Hoggarty Diamond* (1841) and *Barry Lyndon* (1846), the latter one of his greatest works. He was, however, still unknown to the general public, and first obtained recognition by *The Snobs of England* (1846), which was printed in *Punch*, to which he had contributed regularly since 1842. *Mrs. Perkins' Ball* (1847), a 'Christmas book,' brought him further popularity, but he did not become famous until the publication of *Vanity Fair*, which was brought out

Thais, a celebrated Athenian courtesan, who accompanied Alexander the Great on his expedition into Asia.

Thalamus, Torus, or Receptacle, the expanded apex of the pedicel or flower stalk from which the whorls or series of organs that compose a flower spring. It is of great importance in the classification of flowering plants.

Thalassema, a genus of unsegmented marine worms of the group Gephyrea; some species perforate limestone.

Thalassinidae, a family of macrourous decapods, with a long abdomen and small compressed carapace.

Thalberg, Sigismund (1812-71), a composer and pianist, born at Geneva, studied under Hummel; became court pianist in Vienna in 1830, and during the next ten years made highly successful appearances in Paris, London, Holland, and Russia.

Thale, a vil., Saxony, Prussia, 36 m.
S.W. of Magdeburg. Pop. 13,256.

Thales (c. 640 B.C.), the father of Greek philosophy, and chief of the seven wise men, was a native of Miletus. He taught that water or moisture was the one element from which all things evolved. He appears to have owed much to the astronomy of the Egyptians and to the civilisation of Mesopotamia. Undoubtedly he was, however, the founder of abstract geometry, of the strict deductive form as shown in Euclid's collections; he is also said to have shown how to calculate the distance of a ship at sea, and the heights of objects. In astronomy he was credited by the ancients with the prediction of the total solar eclipse identified by Airy, Zech, and Hind with the date May 28, 585 B.C.; he is also said to have noted the 'Lesser Bear' and to have shown its superiority for the purposes of navigation.

Thalheim, a vil. of Saxony, 9 m. S.S.W. of Chemnitz. Manufs. cotton and woollen goods. Pop. 7711.

Thalia, one of the nine muses (q.v.); in later times the muse of comedy.

Thalictrum, or Meadow Rue, a genus of perennial plants (order Ranunculaceae). Six species are British, the commonest of which is *T. flavum*, the yellow meadow rue, a tall plant with bipinnate leaves and crowded pale yellow flowers.

Thallium (Tl, 204.1) was discovered by Crookes (1861) in the seleniferous deposits from the sulphuric acid manufactory. It occurs in small quantities in iron pyrites, and also associated with copper, silver,

displacement from its solutions by means of zinc. It forms a spongy mass which is fused beneath potas-

sium cyanide. It is a soft heavy metal (sp. gr., 11.2; melting point, 300°) which tarnishes in air forming a film of thallous oxide, while on exposure to air and water thallous hydroxide ($TlOH$) forms slowly. This latter is soluble in water, the solution absorbing carbon dioxide rapidly to give thallous carbonate. Two oxides of the metal are known, Tl_2O and Tl_2O_3 , from which are derived the thallous and thallic salts.

Thallus, a body of simple structure. The term is commonly applied to the body of any plant belonging to the Thallophyta, one of the main divisions of the vegetable kingdom, and including seaweeds, lichens, and fungi.

Thalwil, or Thalweil, a vil. in the canton of Zürich, Switzerland, 0 m. S. of Zürich and on the lake. Pop. 7724.

Thames: 1. A trib. of the Thames, England; it rises in Buckinghamshire, and joins the Thames on the l. b. near Wallingford. 2. An urban dist., England, 13 m. E. of Oxford, in the co. of Oxfordshire. Pop. (1911) 2957.

Thames, The, a river, England, rises near Cirencester in the Cotswold Hills and follows a course of some 190 m. to Gravesend, the head of the estuary, where it has a width of half a mile, gradually increasing then to 10 m. at the Nore lightship about 20 m. further. By the addition of its

ne, Leach, and
navigable for
lade, where the
canal to the Severn leaves. At Oxford
the navigability improves, and the
Wilts and Bucks Canal joins a few
miles down at Abingdon, the Wye
Canal leaving *via* the Kennet at
Reading. From here barge and tug
traffic, with important depôts at
Reading and Kingston, is of import-
ance, while river steamers ply be-
tween the latter place and Oxford.
Tidal waters are reached a few miles
further at Toddington, the first lock
from the sea except for the tidal lock
at Richmond. Until the Tower Bridge
was built, London Bridge was the
lowest in the course, and ocean-going
vessels still reach the latter, the
region being known as the Pool of
London. Gravesend, 20 m. lower,
grew up at the spot where vessels
waited the turn of the tide. A little
farther the Medway, by virtue of its

who waters from here to the North
lightship are of great strategic
importance, hence there is here a
station for destroyers, torpedo-boats,
and gun-boats. Sheerness and Shore-

ham as land defences add to this. From London Bridge downwards the river is lined with decks and wharves, the former being now under the Port of London Authority. At Woolwich, on the south bank, 8 m. below London Bridge, is the arsenal, and a little further up the river Greenwich Observatory. Historically, the T. is unsurpassed by any river of the world. A slight rise surrounded by marsh on the left bank formed at the first point suitable for bridging a strategic site for London, the tide giving facilities to it as a port, while yet placed well up the river for defensive purposes. Still further up, a dominating site for the lower valley is found at Windsor for the mediæval kings. In Anglo-Saxon times the kingdoms were divided by the river, and the break in the Chiltern Hills at Goring was a check in the line of aggression. Eton and Oxford are the greatest seats of learning throughout English history till the 19th. century, the former under the shadow of the royal castle, the latter secluded, an ideal home for the peaceful pursuits of learning. The T. was once much larger, and in the remote past probably followed a course through a large plain, now the North Sea, where it joined the Rhine and Elbe, forming a mighty river embouching into the Norwegian Sea.

Thames and Severn Canal, leaves the Thames at Lechlade, and reaches Stroud, 30 m. N.W. The North Wilts Canal communicates with it at Cricklade, and the Stroudwater Canal from the Severn at Stroud. It runs through the counties of Wilts and Gloucestershire.

Thames Conservancy. The duty of maintaining the purity of the Thames and regulating the navigation generally is vested in the Thames Conservancy Board, a body which came into existence in 1857. Prior to that date the duties relative to the lower part of the river devolved upon the Corporation of London, those relative to the upper part upon the Upper Thames Commissioners. The Thames Conservancy Act of 1857 transferred the powers and duties of those two bodies to the Thames Conservators, the members of which board were increased by the Consolidating Act of 1894. This Act provides for the appointment of thirty-eight conservators, thirty-one to be nominated by the Board of Trade, the Admiralty, Trinity House, the councils of the various counties through which the river flows, and the old metropolitan water companies, seven to be elected by Thames shipowners, dock proprietors, and wharfingers. From Yantlett Creek the river as far as

Cricklade is subject to the jurisdiction of the Thames Conservancy Board, but the Port of London water (so much as lies between Yantlett Creek and London Bridge) is regulated: (1) By the board as to all matters not specially delegated to any other public body; (2) by Trinity House as to pilotage and lighting matters; (3) by the Port Sanitary Authority as to sanitary matters; (4) by the Board of Trade as to registration of ships; and (5) by the London County Council as to piers and landing places. The whole of the river above Teddington Lock towards its source is exclusively governed by the byelaws of the Thames Conservancy Board. The principal duties of the board have to do with the preservation from pollution of the river, both in the main stream and in tributaries, docks, and canals, the protection of fisheries and the control of navigation.

Thames Ditton, a vil. of Surrey, England, opposite Hampton Court Palace, on the R. Thames. Pop. (1911) 5000.

Thana, see TANNA.

Thane, or Thegn, a title of honour in the Anglo-Saxon nobility. Originally the term was applied to the personal followers of the kings and signified a minister or honorable retainer. Ts. among other royal household officers were chosen to be advisers of the king as distinct from the general assembly of the *Witan*. Later the thegnhood developed into a powerful territorial nobility with royal grants of *Sac* and *Soc* (i.e., right to hold a court for one's tenants and the right to the amercements received from such court, respectively). The early institution of the thegnhood suggested to the Norman kings the military system based on the 'ut apart from the fyrd or of emergency.

The Ts. did not hold their lands on condition of military service as did the tenants by *knight service*, but received them rather as a reward for past services.

Thanet, Isle of, a one time island, now part of the mainland in the co. of Kent. The watering-places of Ramsgate and Margate are both situated here. At Ebbsfleet St. Augustine is supposed originally to have landed in 597, and in 449 Hengist and Horsa. Jutish sea phratos are supposed to have landed also.

Thanet Sands, the lowest division of the Eocene system (q.v.) and exposed in the London basin. They are well shown in the Isle of Thanet, and have afforded many fossils, e.g., *Scalaria*, *Boworbankil*, and *Pheladomya Konlneckil*.

Thanksgiving Day, an annual festival of thanksgiving in the United States, now always celebrated, according to the choice of President Lincoln in 1864, on the last Thursday in November. It is in essence a national harvest celebration, and was first observed by the Pilgrim Fathers at Plymouth in 1621, after they had gathered in their first harvest.

Thann, a tn. in Alsace, Germany, 21 m. S.S.W. of Colmar. It has a Gothic church dating from the 14th century, and is also engaged in manufacturing silk and cotton goods and machiery. Pop. 7414.

Thapsia, or **Deadly Carrot**, a genus of perennial plants (order Umbelliferae) with a carrot-like root and umbels of yellow flowers, and large doubly or trebly pinnate leaves of considerable decorative value.

Thar and Parkar, a dist. in the E. of Sindh, Bombay. It divides naturally into two parts—the fertile plain of Nara and a dry and desert region. The administrative headquarters are at Umarnot. Pop. 389,000.

Tharawadi, a district of Lower Burma, in the Pegu division. The cap. is T., 68 m. N.W. of Rangoon. Area, 2851 sq. m. Pop. (district) 396,000; (town) 6000.

Thases, or **Thasus**, an island in the N. of the Aegean Sea, off the coast of Thrace. It was early taken possession of by the Phœnicians, on account of its valuable gold mines. T. was afterwards colonised by the Parians, 708 B.C., and among the colonists was the poet Archilochus. The Thracians once possessed a considerable territory on the coast of Thrace, and were one of the richest and most powerful peoples in the N. of the Aegean. They were subdued by the Persians under Mardonius, and subsequently became part of the Athenian maritime empire. They revolted, however, from Athens in 465 B.C., and after sustaining a siege of three years, were subdued by Cimon in 463. They again revolted from Athens in 411, and called in the Spartans, but the island was again restored to the Athenians by Thrasybulus in 407.

Thaton, a tn. of Lower Burma, in the Tenasserim district, formerly a seaport, and the capital of the Talaiag kingdom—now about 10 m. from the sea. Pop. 15,000.

Thaumatrope, see **ZOETROPE**.

Thaxted, a tn. of Essex, England, on the Chelmer, 18 m. N.W. of Chelmsford. Pop. (1911) 1600.

Thayet-myo, the cap. of the dist. of T., Lower Burma, on the Irawadi, 38 m. N.N.W. of Prome. The chief products are rice, cotton, and cotton seeds. Pop. 16,000.

Theagenes: 1. (Θαγένης.) Was tyrant of Megara. He obtained his position about 630 B.C. by espousing the cause of the people against the nobility, but was ultimately driven out. 2. The son of Timosthenes, and a native of Thasos (fl. 480 B.C.). He was a renowned athlete and gained numerous victories at the Olympian, Pythian, and Isthmian games.

Theatines, a religious order in the Romish Church, so called from their principal founder John Peter Caraffa, then bishop of Theate, or Chieti, in the kingdom of Naples, and afterwards pope, under the name of Paul IV., in 1524. This order was the first which vainly endeavoured, by its example, to revive among the clergy the poverty of the apostles and first disciples of our Saviour.

Théâtre Français, see **COMÉDIE FRANÇAISE**.

Theatres, Laws Relating to. By the Theatres Act, 1843, all theatres for the 'performance of stage-plays' must be licensed. Stage-play by section 23 includes 'every tragedy, comedy, farce, opera, burletta, interlude, melodrama, pantomime, or other entertainment of the stage.' But, says Mr. Strong (*Dramatic and Musical Law*), 'it required no less a person than "Pepper's ghost" to appear in a court of justice in order to get a decision of this definition.' A *ballet divertissement* which merely 'consists of poses and evolutions by a number of elegant ladies' is not, but a *ballet d'action*, which usually has in it the shadow of a regular dramatic story, is, a 'stage play' for the purposes of licensing law. The Lord Chamberlain is the licensing authority as to all theatres (except patent theatres, the only existing example of which is Covent Garden) within the parliamentary boundaries of London and Westminster, and in the boroughs of Finsbury, Marylebone, Tower Hamlets, Lambeth, Southwark, New Windsor, and Brighton. In county boroughs the licences are granted by the town councils, in non-county boroughs by the county council, while the L.C.C. is the authority for those parts of London which are not within the jurisdiction of the Lord Chamberlain. A licensee will be granted to the manager of the theatre only. (As to licensing of plays, see **ENSORSHIP OF THE DRAMA**.) Keeping a 'theatre' without a licence entails a penalty of £20 for every day; representing for hire a stage play in an unlicensed place, a daily penalty of £10; performing a new play without the leave of the censor, £50, and avoidance of the theatre licence. The law on the subject of employing children on the stage is contained in

Theft. In most communities, ancient and modern, the institution of private property has occasioned the formulation of copious laws for the redress of violations by T. of the exclusive rights of ownership. But in an age of ungoverned violence, when legislators or law-givers had not as yet attained to the conception of the preservation of public order for its own sake, the legal code of an ancient state reflected a very different view of the moral aspect of stealing from the modern view, or even from that of the earliest Christianised communities. Maine asserts with a great show of probability that the ancient Roman and Grecian codes had no real law of crimes at all, and that such penal laws as they do reveal are no more than the law of wrongs or torts (*see TORT*). The first civil wrong recognised by the Twelve Tables was that of *furtum* (T.), and even assaults and violent robbery were no more than *delicta* (torts). All such wrongs gave rise to an obligation or *vinculum juris*, the fulfilment of which was considered complete with the payment of money. T. is defined in the *Institutes* of Justinian as *trahitio rei*—the taking of another's thing, or with the intent to appropriate it, which is prohibited by natural law.

This definition affords some striking points of resemblance to most modern definitions of stealing (*cf.* that of larceny in English law, *under* LARCENY); *e.g.* the word *contrectatio* imparts the notion of touching or handling (*see* TRESPASS), while *fraudulosa* indicates that to constitute T. the thing must be seized with evil intent. The

form of dishonesty treated of in the most ancient Roman law is T. (meaning thereby larceny). *See also* BURGLARY, EMBEZZLEMENT, FALSE PRETENCES, and LARCENY.

Theine, *see* CAFFEINE.

Theiner, Augustin (1804-74), a German Roman Catholic historian, was born at Breslau. After wavering in his religious views, he returned to the Church of Rome in 1833, and was afterwards made a priest of that communion and a member of the oratory. He wrote *Geschichte des Pontificats Clemens XIV.* (1853), and published an edition of the *Annals* of Baronius (1864).

Theiss (Hungarian *Tisza*), the most important Hungarian riv., rises in two head-streams on the slopes of the Carpathians, where it is known as the White T. and the Black T. It takes a winding course, generally in a W. or S.W. direction, to empty its waters into the Danube near Titel, after receiving the Szamos, Maros, Körös, Sajó, and Latorcza. Length 820 m.

Thelemark, a mountainous region in the district of Bratsberg, Norway. The culminating point is Gausta (6200 ft.).

Thellussen Act. By this Act (1800) no accumulation of rents or property, whether real or personal, may by any instrument be directed for longer than one or other (and one only) of the following periods, viz. (1) life of settlor, or (2) twenty-one years after, or (3) minority of any person in being at the death of the settlor or testator, or (4) minority of any person who, if of full age, would, under the deed or will, be entitled to the rents and profits. Any accumulation exceeding the statutory period is bad only to the extent of the excess and not *in toto* as under the rule against perpetuities (*q.v.* and *see* LAND LAWS). The Act does not apply to provisions (1) for payment of debts, (2) for raising positions (*q.v.*), or (3) concerning produce of timber. The Act was passed in consequence of the extraordinary will of one Mr. Thellusson, who harshly directed the income of his property during the lives of grand- and great-grand-children were living at the

time of his death, for the benefit of some future descendants to be living at the decease of the survivor, thus keeping within the letter of the rule of perpetuities which allowed any number of existing lives to be taken as the period for an executory interest. *See* ACCUMULATION.

Thelwall, John (1764-1834), an English author and reformer, born in London. He wrote *Poems on Various Subjects* (1787), and other works; but after the French Revolution devoted

that extension as apocryphal, and it is almost certain that the idea of gain was not implicit in the Roman definition of T., and that the taking of another's goods out of mere spite or to destroy them was enough. This assumption seems warranted by a later passage in the *Institutes* which provides that it is T. 'not only when any one takes away a thing belonging to another, in order to appropriate it, but generally when any one deals with the property of another contrary to the wishes of its owner. Thus . . . if any one borrows a horse as for a ride, and takes it . . . into battle.' Though, whether by reason of the influence of Christian ideas or the attainment of a more subtle analysis of motive, the text continues, 'A person, however, who borrows a thing and applies it to a purpose other than that for which it was lent, only commits T. if he knows he is acting against the wishes of the owner, . . . for there is no T. without the intention to commit T.' In England, the doctrine of the King's Peace was the foundation of T. as a public wrong; on the continent it is to be traced to the source of *Naturrecht* or Natural Law (*see* JURISPRUDENCE), the first effect of which upon T. is to be found in the Roman *Institutes*, which characterise *furtum* as an act prohibited by natural law. (*See also* *JUS GENTIUM*.) The Anglo-Saxon laws of Inc, Athelstan, and others respecting the punishment of T. reveal a curious compromise between the Draconian severity of a pagan state and the mildness inculcated by the Christian missions from Rome. death was nominally the punishment in cases of T. where the value of article taken exceeded 12d.; but in practice the thief could always compound his offence by a fine. Up to comparatively recent times, however, felonious T. remained a capital offence (*see* CAPITAL PUNISHMENT). At the present time T. connotes a variety of cognate but distinct offences, varying from larceny (*q.v.*) to fraudulent breach of trust. In this connection it is instructive to recall with Malin the erroneous inference drawn by many from the fact that the only

Theodectes (c. 376-335 B.C.), a Greek orator and tragic poet, born at Phaselis. His father Aristander caused him to study under Plato, Isocrates, and possibly Aristotle, who

dedicated to him one of his treatises of rhetoric. He also wrote several orations and poems on the art of oratory.

Theodelinda (fl. 589-625), Queen of the Lombards, daughter of the Duke of Bavaria. She became the consort of Antharis, and did much to introduce Christianity into Lombard Italy.

Theodicy (Θεός, God, and δίκη, justice), the vindication of the justice and goodness of God in the creation and government of the world. See works on the subject by Benedict (1822), Von Schaden (1842), J. Young (2nd ed. 1861), etc.

Theodolite, the most important of the instruments used in surveying, by which the measurement of angles, vertical, but especially horizontal, is performed. It consists of a telescope mounted so as to move on two graduated circles, one of which is horizontal, and the other vertical. The axes of the telescope pass through the centres of these two circles. The instrument is carefully adjusted on a pedestal, which when in use stands upon a tripod stand. An elaborate arrangement of screws and plates enables the T. to be adjusted with

ough the
tical and
only can
accuracy.

For the measurement of vertical angles a levelling instrument is more accurate. There are three main types of T.—the Everest, the Y-pattern, and the transit—but the differences between them do not essentially affect the construction. It is important to notice a change that has been made in graduating Ts. Until recently, British Ts. were divided into degrees, of which 360 made the complete circle, but they are now frequently made with the French centesimal graduation in which the circle is divided into 400 divisions.

Theodora (c. 508-548 A.D.), wife of the Byzantine emperor Justinian, notorious before her marriage as an actress and dancer of ill-repute, was proclaimed empress in 527. She showed high courage in the Nika insurrection (532), and was an able counsellor in all matters of state.

Theodoro (1590-1756), 'King of Corsica,' Baron de Neuhoft, born at Metz. Early left an orphan, he served France and Sweden as a soldier, and helped in a plot to re-establish the Stuarts in England, but his plot was discovered, and he had to flee. He later served Alperoni. Marrying an English wife, he stole her jewels and deserted her. He entered the service of Charles VI., who appointed him resident at Florence. He headed a Corsican rising (1738), and was proclaimed as

King Theodoro I. His short period of government was able and energetic. Deposed by the Genoese (1738), he came to London, was imprisoned for debt, but was liberated through the good offices of H. Walpole, and died there.

Theodore of Abyssinia, see **ANTS-SINIA**.

Theodore of Mopsuestia (c. 350-428), a learned bishop and biblical scholar of the Eastern Church, born at Antioch. He was the leader of the Antiochene or literal school of exegesis. See editions of various parts of his extant works by Fritzsche (1847), Sweto (1880-82), Mai (1832 and 1854), and Sachau (1869).

Theodoretus, or **Theodoritus** (c. 393-457 A.D.), was brought up under the care of a pious mother, and had instruction from Theodoro of Mopsuestia and John Chrysostom in a monastery. T. became a deacon in the church at Antioch, and in 423 was chosen bishop of Cyrus, a city in Syria. Against the opinions of the heretics he directed his efforts with so much success that, according to his own statement, he baptised 10,000 Maronites. In 431, when Nestorius was condemned by the Council of Ephesus (see **NESTORIANS**), T. was one of those who assembled and condemned its proceedings. He warmly protested when John, patriarch of Antioch, gave his consent to the condemnation of Nestorius. In 449 T. was deposed from his bishopric, and he was compelled to retire into the monastery where he had been educated. In 451, however, an oecumenical council was assembled, to which T. was summoned. By condemning Nestorius he was restored to his bishopric. His works were: *A History of the Church*, from 325 to 429; *Φιλόθεος ιστορία*; *Ten Orationes against the Heathen*; *An Apology for Christianity*; besides 146 letters and commentaries on books of the O.T. and on the epistles of St. Paul; and some others.

Theodoric (or **Theoderic**) I., King of the Visigoths, son of Ala-ric II., and warred against the Franks, 425-40, defeating them at Vouillé (439),

son, became King of the Visigoths (452-66), after murdering the elder Thorismund, and ruled over most of Spain and Gaul. He was assassinated by his brother Euric.

Theodorico the Great (455-526 A.D.), founder of the Ostrogothic monarchy. As a child he was a hostage at Con-

stantinople, and soon after his return to his father, Theudemir, attacked the king of the Sarmatians and captured Singidunum (Belgrade). Theudemir and his son now successfully invaded Moesia and Macedonia, and on Thoudemir's death (c. 474), T., after some raids against the Emperor Zeno and a rival Gothic chieftain, set out to win Italy from Odoacer, whom he defeated at Verona. The conquest was delayed by treachery, and Ravenna, whither Odoacer had fled, was besieged. At last there was a capitulation, which T. violated by slaying Odoacer (493). T.'s thirty-three years' reign was a period of peace and prosperity for Italy. He maintained his traditional Arian creed, but was impartial in religious matters. He figures in the Nibelungenlied, being known to the Germans as Dietrich von Berne (Verona).

Theodorus (fl. 4th century), a Greek philosopher of the Cyrenaic school, was a pupil of Arctus, the daughter of Aristippus. He wrote a work on the gods, *Περὶ θεῶν*, which brought him into disrepute as an atheist.

Theodorus Lascaris, the name of two emperors of Nicea. *Theodore I.* was born about 1175, and was crowned Emperor of Nicea in 1206, waging war against the Latins both before and after. He died in 1222. His grandson, *Theodore II.*, came to the throne in 1255. His reign was spent chiefly in conflict with the Bulgarians.

Theodosius, an able Roman general of the reign of Valentinian I. He fought against the barbarians of Britain and Germany (367), and crushed a Moorish insurrection in Africa (373). The reason of his execution at Carthago (376) is unknown. His son was the Emperor Theodosius the Great.

Theodosius I., Flavius, the Great (b. c. 346 A.D.), a Roman soldier, born in Spain, son of Gonorat T. (d. 376). He became Roman emperor of the East (c. 378-95). T. entered the Christian church, and was noted for his zeal against the Arians. He warred successfully against the Goths, concluding peace with them (382). With them as allies and with the Huns, he defeated (383-88) the usurper Maximus who had laid claim to Gratian's empire, and secured the throne of the West for Gratian's brother, Valentinian II. After the latter's death (392) T. became sole emperor (394). The cruel massacre by means of which he avenged the riot at Thessalonica (390) has branded his name with infamy. St. Ambrose, Archbishop of Milan, persuaded him to undergo penance in order to be cleansed from his sin. T. divided his empire between his sons, Honorius

and Arcadius, the former ruling the West, the latter the East. See Fléchier, *Hist. de Théodose le Grand*, 1679; Socrates Scholasticus, *Hist. Ecclesiastica*; Tillemont, *Hist. des Empereurs*; Lo Beau, *Hist. du Bas-Empire*; Hodgkin's *Dynasty of Theodosius*, 1889.

Theodosius II. (401-50), grandson of T. the Great, and son of Arcadius, succeeding him as emperor of the East (408). His sister, Pulcheria, and the praetorian prefect, Anthemius, ruled during his minority. Wars with the Persians (421-41) and the Huns under Attila (441-48) were among the chief events of his reign. The *Codex Theodosianus*, a collection of Imperial Constitutions in 16 books, was published in 438. See Gorlaach, *De Theodosius Juniore*, 1751; Gudenpenning, *Gesch. des oströmischen Reiches unter Arkadius und Theodosius II.*, 1885; Mommsen and Meyer, *Theodosii Libri XVI.*, 1904-5.

Theodosius of Bithynia, a mathematician mentioned by Strabo and Vitruvius, who calls him the inventor of a universal sundial (lx. 9). He lived before the time of Augustus, but is often wrongly confused with T. of Tripolis, author of *Σφαῖρικὰ*.

Theodule, St., an Alpine pass, 10,896 ft. in height, which connects Val Tournanche in Piedmont, Italy, with Zermatt in the Niklausthal, Switzerland. It is always snow-covered.

Theognis of Megara (b. c. 540 B.C.), an elegiac and gnomic poet, was by birth a noble. He was deprived of all his property and shared the exile of the oligarchical party. The greater part of his poems were composed during his period of exile. He is the best preserved of the Greek elegists, and owes his fame chiefly to his 'maxims.' See Introduction to Prof. H. Williams's ed. of *Theognis*, 1910.

Theogony (Gk. *Θεός*, God; *γόνος*, seed), a genealogy of the gods. Many early Greek poets wrote verso theogonies, of which only one, that of Hesiod, is extant.

Theology (Lat. *theologia*, from Gk. *θεολόγια*, 'speaking concerning God'), a term widely, but somewhat inaccurately, used as equivalent to religion. T. is the science of religion, dealing therefore with God, and man in his relations to God. The term may be still further restricted to mean systematic T., in which department it deals with the specific doctrines, principles, and characteristics of Christianity alone. T. is treated under two main heads: Natural and Revealed T., and until the last century it was usual to keep the two subjects strictly apart. Various causes, chief of which is the applica-

tion of the theory of evolution to religion and T., have conspired to do away with hard and fast divisions of this kind. Modern thought, in T. as elsewhere, strives to minimise the importance or deny the existence of critical points in the world's history, and to trace instead an orderly development. It is evident that without an entire break with historic Christianity, no such change can take place with regard to dogmatic T. Here, however, the influences have taken the shape of a tendency to somewhat drastic restatement. Restatement is, of course, no new thing in T.; it is, indeed, necessary to its existence as a science. Moreover, though its working is on different lines, it is doubtful whether the modern restatement is any more complete than that which culminated in the *Summa Theologia* of Aquinas. By the comparison of this great work with the book *Foundation*, published in 1912 by Seven Oxford Men, some idea of the nature of the change that has taken place may easily be gathered.

Theon, Ælius (fl. 4th century A.D.), an Alexandrian grammarian, the author of *Progymnasmata* (Προγυμνάσματα), which lays down practical rules on rhetoric. It was first published at Rome in 1520. Consult Walz, *Rhetores Græci*, vol. i.

Theon the Elder, a native of Smyrna, and a contemporary of Ptolemy. He was a follower of Plato, and wrote a mathematical treatise, part of which was edited by De Gelder in 1827.

Theon the Younger, of Alexandria, also a Platonist, flourished in the latter half of the 4th century; was the father of Hypatia, who was murdered by the populace of Alexandria (415 A.D.). He wrote commentaries on Ptolemy, Euclid, and Syntaxis.

Theophany, a manifestation of himself by God to men, especially that given in Jesus.

Theophilanthropism, a religion devised in Paris during the Revolution period (1796) to replace the abolished Christianity.

Theophilus (fl. 2nd century A.D.), a bishop of Antioch, for Christianity (see *getarum*, vol. viii., 1861). To him, too, is sometimes attributed a commentary on the Gospels.

Theophrastus (c. 372-287 B.C.) Greek philosopher, born at Eres, Lesbos. He was the pupil of Aristotle in Athens, and on the death of the latter became head of the Peripatetic school, which drew large numbers of pupils from all parts. He was a close follower of the

Aristotelian philosophy, giving his attention specially to natural history and to botany. His chief works include treatises on politics, legislators, laws, metaphysics, the senses and the imagination, oratory, poetry, and plants.

Theophylactus, or Theophylact (d. c. 1110), a Greek ecclesiastic and biblical commentator. He became archbishop of Aethrida in Bulgaria (c. 1078-1107). T. was a deacon at Constantinople and tutor of Constantine Porphyrogenitus, son of Michael VII. He wrote *Παιδεία Βασιλική* (Education of Princes), commentaries on the Minor Prophets, and other works. See De Rossi's edition of his *Works* (1754-63). Consult Krumbacher, *Byzantinische Literaturgeschichte* (2nd ed., 1897).

Theophylactus, Simocatta (c. 580-630 A.D.), a Byzantine historian of Egyptian race. He held public posts under Heraclius at Constantinople from 610 onwards. T. wrote a history of the Emperor Maurice (582-602); *Ἀπορίαι φυσικαὶ* (*Quæstiones Physicæ*); and eighty-four *Letters* (*Morales*). See Bekker's ed. (1838) and Boissonade (1896) for the *Quæstiones*.

Theopompus of Chios (b. c. 378 B.C.), a celebrated Greek historian, studied rhetoric under Isocrates at Chios. He shared the exile which his father had incurred by espousing the Lacedæmonian cause, but was restored to his country in 333 B.C. He then took a leading part in politics on the aristocratic side, and raised a host of enemies, among whom was the sophist Theocritus. About 305 B.C. he was expelled from Chios and fled to Egypt. Nothing is known of his further fate. T. composed histories and orations, but none of his works are extant. He is praised by the ancients for his diligence and accuracy. See Bury's *Ancient Greek Histories* (1909).

Theorbo, a stringed instrument resembling a lute, used as an accompaniment to the voice. It had two heads or nuts, with the upper and middle strings attached to the lower head, and the lower strings to the upper one.

Theoria (Gk. θεωρία, something to be looked at or seen), in mathematics, any proposition which states its conclusion, or makes some statement of negation requiring a problem states it is to be done.

Theoria, in logic, properly speaking, the process of reasoning and known truth dependence of truths upon one another. When thus understood, it is at once evident that the opposition

frequently made between facts and Ts. is an incorrect one. Tho T. is merely the co-ordination and interpretation of facts, based on them and in a way containing them. An opposition, however, has really arisen in many cases because so few Ts. are perfect. A perfect T. harmonises with all the facts and completely fulfils its work. An imperfect T. is always inadequate, and is often definitely wrong. Hence it is that the common distinction between fact and T. has arisen. In another sense a distinction is made between T. and practice, but here again the distinction is largely due to the prevalence of imperfect Ts. Those who are anxious to make this distinction, understand by practice the application of that knowledge which comes from experience only, and is not sufficiently connected with any general principles to be entitled to the name of a T. But the distinction between theoretical and practical labourers in the field of science or art is not strictly a just one, for there is no theorist whose knowledge is all T., and there is no practical man whose skill is all derived from experience. Regarding, however, the higher class of men to whom one would apply the terms theoretical and practical, one sees that there are obvious faults to which both parties are subject.

Theosophy, meaning divine wisdom, dates from a very high antiquity, coming down to us from the Neoplatonists, Plotinus, Iamblichus, and Proclus. Numbered among them also are Paracelsus, Boehme, and the Rosicrucians. In the East also T. is of very ancient origin, the Sanskrit equivalent being *Brahma-Vidyā*, or divine knowledge. It is closely allied to mysticism, and involves a belief in one absolute incomprehensible and supreme deity, which is the root of all nature, and of all that is visible and invisible, a belief in man's eternal nature, which, being a radiation of the universal soul, is of an identical essence with it, and a belief that by returning to the purity of nature, one can gain certain occult powers. T. has always had as an aim the reconciliation of all religions and nations under a common system of ethics. Helena Petrovna Blavatsky (1831-91), a Russian princess, who it is claimed was initiated in Tibet, is the recognised founder of the two great branches of to-day. T. is supposed to be preserved by initiates scattered over the world who have attained spiritual perfection, but elect to watch over the religion. A group of these Arhats, Mahatmas, or Masters, it is said, led H. P. Blavatsky to found the Theosophical Society in

1875. Its teachings in general may be said to be founded on the two great principles of *Karma*—which in Christian terminology would mean 'Whatsoever a man sows that shall he also reap'—and *Reincarnation*, or the belief that man must undergo a series of lives until he has assimilated all the soul experiences and can attain to Nirvāna. The terminology and the thoughts seem to the Western to be Buddhistic, but it is claimed that T. is not Buddhism. After H. P. Blavatsky died, W. G. Judge, of America, became the leader, and upon his death the society split into two sections, one following Mrs. Katherine Tingley, and the other Mrs. Annie Besant. See H. P. Blavatsky, *The Key to Theosophy*, *Isis Unveiled*, *The Secret Doctrine*.

Theotocopuli, Domenico (surnamed El Greco) (c. 1545-1625), a Spanish painter and sculptor, probably a pupil of Titian. In 1577 he was living at Toledo in Spain, and painted 'The Parting of Christ's Raiments . . . ' for the cathedral there, and 'The Entombment of Count Orgaz, 1323' for the church of Santo Tomé (1584). His 'Saint Jerome' is in the National Gallery, London. T. constructed and decorated the church and monastery of the Bernardine monks at San Domenico di Silvos, and designed the church of the Augustines at Madrid.

Thera, or Santorin, a volcanic island in the Aegean Sea, one of the Cyclades. It forms with the island of Therasia and the islet of Aspronisi a ring, the crater of the volcano, in the midst of which lie three small islands, Palea, Mikra, and Nea Kaumene. The highest point of T. is Mt. Elias (1910 ft.), which existed before the volcano was formed. The modern town of Thera is built at a height of 900 ft. on the cliffs, which rise perpendicularly from the water, and the foundations of the houses are excavated in the tufa, or other volcanic strata. Numerous rock carvings and inscriptions have been discovered, and near the foot of Mt. Elias is the temple of Thea Basilicia. T. was important in ancient history, having colonised Cyrene on the N. coast of Africa in 631 n.c.

Theramenes, an Athenian, son of Hagnou, was a leading member of the oligarchical government of the 400 at Athens, in 411 n.c. Subsequently, however, he not only took a prominent part in the deposition of the 400, but came forward as the accuser of Antiphon and Archepolemus, who had been his intimate friends. After the capture of Athens by Lysander, Theramenes was chosen one of the Thirty Tyrants (404). See Thirlwall, *History of Greece*, vol. iv.

Therapeutæ, an ascetic sect akin to the Essenes, described in an anonymous work once ascribed to Philo Judæus (*Concerning the Contemplative Life*). This work is now held to be a forgery.

Therapeutics, **Therapeusis**, or **Therapy**, that branch of the science of medicine which deals with the cure of disease, the relief of certain symptoms, or the prevention of their occurrence by various agencies. Remedial agencies are divided into classes, according to general similarity of treatment, e.g. aerotherapeutics (*q.v.*), balneotherapeutics (*q.v.*), electrotherapeutics (*q.v.*), psychotherapeutics or hypnotism, serum therapeutics (*q.v.*), vaccine therapeutics (*q.v.*), hydrotherapeutics or hydrotherapy (*q.v.*), etc.

Theresa, **St.**, see **TERESA**.

Theresienstadt, a tn. in Bohemia, on the Eger, near its confluence with the Elbe, 32 m. N.N.W. of Prague, and 17 m. from Teplitz. It is the principal fortified place in Bohemia. Pop. 6094.

Theresopolis, a colony of Brazil (German), situated in the state of Santa Catharina, 34 m. S.W. of Desterro. Pop. 2500.

Therezina, a tn. of Brazil, in the prov. of Piahy, of which it is the capital. The manufacture of cotton thread, etc., is extensively carried on. Pop. 25,000.

Theriaca, a pharmacological term for treacle or molasses. The word is derived from *θηρίον*, a wild beast, the compounds originally known as theriaca being supposed to act as antidotes to poisonous bites. *T. andromachi*, or Venico treacle, contains seventy ingredients; its invention is ascribed to Andromachus, Nero's physician.

Therm, the British thermal unit (B.Th.U.). It is the amount of heat required to raise one pound of water through 1° F. (from 60° to 61° F.), and equals 251.9 calories (*q.v.*).

Thermæ were the huge buildings erected by the Roman emperors, and comprised not only baths of various kinds, but often libraries, gymnasia, theatres, etc. The different varieties of baths which were taken, and the rooms, were briefly as follows: The apartment for undressing was the *apodyterium*; the *aliptrium* was a room for

in the *frigidarium* we and in the *calidarium*. The *tepidarium* was a warm room, with no bath, in which the bather usually spent some time before undressing. *T.* were built by the emperors Agrippa (21 B.C.), Nero (65), Titus (81), Domitian (95), etc.

Thermal Unit, see **CALORIE**.

Thermia, or **Kythnos**, one of the chief islands of the Cyclades, Greece, situated in the Bay of Hagia Irini. It possesses mineral springs, which are much frequented in the summer.

Thermidor (from Gk. *θερμη*, heat, and *δωρον*, gift), a month in the Republican calendar, introduced at the time of the French Revolution. It extended from July 19 to August 18.

Thermit, or **Thermite**, a mixture of finely powdered aluminium and oxide of iron ('hammer scale,' Fe_2O_3), the heat of combustion of which produces a temperature of about 3000° C. It was invented by Mr. Claude Vauton of London and utilised for welding by Dr. F.

the reacti lum oxide. tu is done the ends of the rails or plates to be joined. The hot iron and slag raise the temperature of the ends to welding heat and molten iron is deposited in the interstice. Thus on pressing together a perfect joint is made, dispensing with fish plates and electric connections in electric traction rails. The mixture is also used for welding steel tubes and for mending iron castings. Oxides of other metals can be substituted for iron oxide, whereby the pure metal can be obtained as well as many valuable alloys by using mixed oxides.

Thermo-chemistry is the science, founded on the law of the conservation of energy, which deals with the thermal effects accompanying chemical actions. Reactions in which heat is evolved are called 'exothermic,' and where heat is absorbed they are termed 'endothermic.' Measurements of the heat of formation of substances, the heat of solution, of combustion, and of the neutralisation of acids and bases, have been determined. The amount of heat liberated in chemical reaction is determined by allowing it to warm a known quantity of liquid (generally water) whose specific heat is known, and measuring the rise of temperature by means of an accurate thermometer. The water calorimeter generally employed for this purpose consists of an inner platinum vessel surrounded by water contained in an outer vessel of silver, which is protected by poorly

material so as to diminish heat by radiation. The substances, either in the pure solution, are brought to the same temperature and introduced into the inner vessel. The temperature of the water is taken before and after the reaction, and from the rise of temperature, the quantity of water present, and its specific heat (and knowing the water equivalent of the

calorimeter), the amount of heat liberated is determined. In order that a reaction may be studied thermo-chemically, it must take place at ordinary temperatures, and must proceed rapidly to the end. Many reactions which do not fulfil these conditions, such as many processes of combustion, can be made to fulfil them. This is done by causing the substance to be burnt, in the presence of oxygen under increased pressure, in a steel bomb lined with platinum or enamel. Only in a comparatively few cases has it been possible to make direct determinations of the heat value of chemical changes. Thermal values, which cannot be determined directly, can be calculated indirectly by methods depending on the fundamental principle of thermo-chemistry which was propounded by Hess (1840). This principle, known as the 'constancy of the heat sum,' may be stated thus: 'The heat evolved in a chemical process is the same whether it takes place in one or in several stages.' The heat change, therefore, is dependent only on the initial and final stages of the reaction or system of reaction. Thus the heat of formation of methane cannot be determined directly, but a value may be arrived at by subtracting the heat evolved when methane is burnt from that evolved when the corresponding weights of free carbon and hydrogen are burnt. The unit of heat used in thermo-chemical measurements is the calorie, or the quantity of heat which is required to raise 1 gram of water from 0° to 1° C. The results of thermo-chemical measurements are expressed by symbols, which mean gram-atomic, or, in the case of compounds, gram-molecular weights of the substances which react. Thus $H_2 + O = H_2O + 68360$ calories means that 68,360 calories of heat are liberated when 2 grams of hydrogen and 16 grams of water unite at ordinary temperatures to form 18 grams of water. If the reacting substances are in solution, the presence of a large quantity of water is denoted by the symbol aq.—thus: $KOH_{aq} + HCl_{aq} = KCl_{aq} + 13700$ calories. As well as being of theoretical importance, thermo-chemistry has been found of great value in determining the heating power of fuels for commercial purposes. See H. C. Jones, *Elements of Physical Chemistry*, 1907; Scott, *Introduction to Chemical Theory*, 1891; Naumann, *Thermo-Chemie*, 1882.

Thermodynamics, as the name suggests, deals with the relations between heat and work. The modern science is based on two fundamental principles. Joule expressed what is now the first fundamental law by the

algebraic equation $W = JH$, where W is the work done, H the heat absorbed or given out, and J is a constant called the mechanical equivalent of heat. This law then asserts that when work is converted into heat, the heat produced is definitely proportional to the work expended, and *vice versa* if heat is used to do work a quantity of heat disappears proportional to the work done. Joule and others spent considerable time and labour in ascertaining the exact value of J . The value now generally accepted as correct is 4.19×10^7 in the C.G.S. system. This first law is based on the dynamical theory of heat, i.e. that heat is a form of energy. Joule's experiments were published in 1843 and 1878.

Carnot's work.—In 1824 Carnot published his famous essay, *The Motive Power of Heat*. Previous to this time the undulatory theory of light had been firmly established, yet the caloric theory of heat still held its own. Carnot worked on the caloric theory, although before his death there is no doubt that he had grasped the idea of the dynamical theory. Carnot's work was unnoticed until Clapeyron, ten years after its publication, cleared up what was faulty in Carnot's reasoning. Any arrangement for the transformation of heat into mechanical energy is termed a heat engine. The latter consists essentially of three parts: (1) The source of heat; (2) the working substance; (3) the refrigerator. In the common steam engine the working substance is the water and steam. Heat is communicated to it from the sides of the boiler. The heat is partly converted into work, and the rest given up to the condenser.

Carnot's cycle.—Carnot imagined an ideal engine in which no heat was lost by friction. In fact he considered a cycle of operations each of which was reversible. Supposing we have a cylinder C with perfectly non-conducting sides, a perfectly conducting bottom, and fitted with a frictionless, non-conducting piston D . The cylinder C can be placed either on a non-conducting slab F , or in connection with the conducting source A at temperature t_1° , or the refrigerator B at temperature t_2° . Let the cylinder contain air, or any other working substance under pressure. This pressure is applied by the piston and can be altered at will. Let the working substance be put through a series of changes known as Carnot's cycle, and let those changes be represented by means of Watt's indicator diagram (*q.v.*). Suppose the working substance to be in the condition, initially, represented by A . Place it on the slab F and compress it adiabatically, i.e. without gain or loss of heat, by gradu-

ally reducing the load on the piston until the state B is reached. The substance will have passed through a series of conditions represented by the line AB. Now place the cylinder in connection with A, and allow it to expand slowly to condition C by releasing the load on D, the piston. In general the substance would cool by such an expansion. But it is kept at constant temperature by heat H_1 absorbed from the source A. The process must be slow so that the temperature of the working substance (W.S.) is never sensibly below that of the source. The series of conditions will be represented by the isothermal line BC. Now place the cylinder back on the slab F and allow it to expand a little more adiabatically. No heat is communicated to it from outside so that the W.S. will

cycle. There are two conditions to be fulfilled ere the process is reversible: (1) That when the W.S. is taking heat from the source or giving heat to the refrigerator its temperature must be sensibly the same as that of the source and refrigerator respectively.

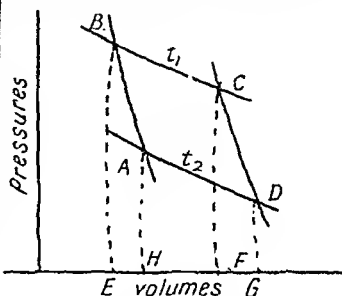


FIG. 2

(2) That the pressure exerted by the W.S. on the piston should be sensibly the same as the load on the piston. These conditions imply that the cycle must be traversed very slowly. A quantity of ice at 0° under atmospheric pressure is an example of a reversible process. Slightly increase the pressure and the ice will melt, release it and the ice is formed again. Ice thrown into water at 10° C. is an example of an irreversible process. No process we know of will change the water back to ice at 10° C. We showed above that W , the work done, is equal to $H_1 - H_2$, the difference between heat taken from source and heat given to the refrigerator. The

efficiency of an engine is equal to $\frac{W}{Q}$

where Q is the mechanical equivalent of the heat taken from the source, i.e. $Q = JH$. Thus $E = JH$. Lord Kelvin, Clausius, and others continued to work on the lines laid down by Carnot, and Kelvin and Clausius both formulated the second law of thermodynamics on slightly different terms. In simple language the law states that we cannot transform heat into work merely by cooling a body already at its lowest available temperature. It is easy to show that all reversible engines working between two given temperatures, and taking in equal quantities of heat from the source are equally efficient. Let A and B be the two engines, of which A is the more efficient. Let A work forwards taking heat H from the source and giving H_1 to the refrigerator. Let B work backwards giving heat H to the source and taking H_2 from the re-

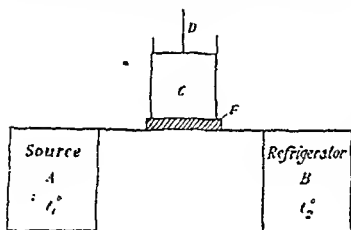


FIG. 1

cool. Let it cool to a temperature t_2° along the adiabatic CD. Place the cylinder in connection with the refrigerator at t_2° and slowly compress the W.S. by increasing the load on the piston. The substance would warm under the compression, but since it is in contact with the refrigerator and its temperature is never sensibly above t_2° , it gives up an amount of heat H_2 to it. Suppose the W.S. has then returned to its initial state A, along the isothermal DA. The area ABCD represents the balance of work done by the W.S., because work BCFE is done by the substance along BC, and work CDGF along CD. When the substance is contracting along DA and AB, work DG, HA, and HEBA, respectively, is done on it. Thus the balance of work done by the W.S. is represented by the area ABCD (see Indicator diagrams). Heat H_1 is taken from the source and heat H_2 given up to the refrigerator. Thus the work done must equal the difference between H_1 and H_2 . The process is reversible, i.e. we could have worked around the cycle ABCD in the direction DCDAD. In each part of the cycle the work done would be equal and opposite to that done in the direct working of the

refrigerator. Since A is more efficient $H_1 > H_2$. There is a balance of work done equal to $J(H_2 - H_1)$, and this comes from the refrigerator, since B restores what heat A takes from the source. Work cannot be done by taking heat from a body at its lowest available temperature. The refrigerator is at its lowest available temperature. Thus H_2 must equal H_1 , and the engines are equally efficient. It is an easy extension to prove that all reversible engines working between the same temperatures are equally efficient, no matter what heat is taken from the source.

Kelvin's absolute scale.—The above proof may be expressed by saying that the efficiency of an engine depends only on the temperatures between which it is working, and not on the W.S. Kelvin devised an absolute scale of temperature from consideration of this fact. Supposing a quantity of heat (Q) were sent down a number of temperature steps, the quantity lessening as each step is passed by the conversion of some

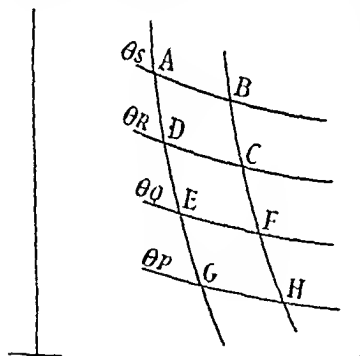


FIG. 3

heat into work, the temperature steps would be equal on Kelvin's scale if an equal amount of work were expended at each step. Let θ_S, θ_P , etc., be a series of isothermals (the temperatures taken on Kelvin's scale). Let AG and BH be two adiabatics. Let an engine working round the cycle $ABCD$ take heat Q_S from the source and give Q_R to the refrigerator. Then work $Q_S - Q_R$ would be done, equal to area $ABCD$. Let another engine work round the cycle $DCFE$, taking heat Q_R from the source and giving Q_Q to the refrigerator. Work $Q_R - Q_Q$ would be done, equal to area $DCFE$. Similarly let engines work between all the temperatures θ_P, θ_S Then, if $Q_S - Q_R = Q_R - Q_Q = Q_Q - Q_P$

. . . the temperature intervals $\theta_S - \theta_R, \theta_R - \theta_Q$, etc., are equal on Kelvin's scale. The efficiency on such a scale is $\frac{\theta_S - \theta_R}{\theta_S}$. Supposing the above

process were continued until no heat were left to be expended as work, we should have reached the zero on Kelvin's scale. The efficiency depends only on the difference of temperature of source and refrigerator. Thus $E = \Delta(\theta_S - \theta_R)$, where A is a constant and θ_S and θ_R the temperatures of the source and refrigerator respectively.

But $E = \frac{Q_S - Q_R}{Q_S}$. Let the process be taken on until all the heat is used up. $\theta_R = 0$ in such a case, and $E = \Delta\theta_S$. But $E = \frac{Q_S - Q_R}{Q_S} = 1$, since Q_R is 0.

Thus $A = \frac{1}{\theta_S}$. Therefore the efficiency is equal to $\frac{\theta_S - \theta_R}{\theta_S}$. Since $E = \frac{Q_S - Q_R}{Q_S} = \frac{\theta_S - \theta_R}{\theta_S}$, then $\frac{Q_S}{\theta_S} = \frac{Q_R}{\theta_R}$. It has been

found that for a perfect gas Kelvin's scale agrees with the gas scale. By a perfect gas is meant one that obeys Boyle's, Charles's, and Joule's laws. The two former are dealt with in HEAT. The latter states that a perfect gas that expands and does no work remains constant in temperature.

Applications of thermodynamics. (a) *To gases.*—For a gas that obeys Boyle's law $PV = RT$, where P = the pressure, V = volume, T the absolute temperature, i.e. temperature on Kelvin's scale, and R is a constant.

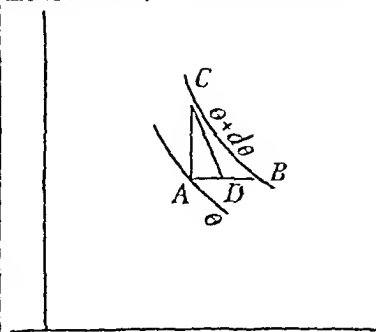


FIG. 4

We shall first prove that the ratio of the specific heats for a gas is equal to the ratio of the two elasticities. Let the gas have the initial condition represented by A (Fig. 4). Let A be on the isothermal θ . Let the gas expand at constant pressure, i.e. along AB , until its temperature is $\theta + d\theta$. Then

contract it along the isothermal ($\theta + d\theta$). Finally allow it to be compressed at constant volume to its final state. Let the change of pressure along AC be dp , and the change of volume along AB be dv . Draw the adiabat through C meeting AB in D. The isothermal elasticity E_θ is by definition equal

to $v \times \frac{\text{change of pressure along CB}}{\text{change of volume along CB}}$.

$$\therefore E_\theta = v \times \frac{AC}{AB}.$$

Similarly the adiabatic elasticity $E_\phi = v \times \frac{AC}{AD}$. Thus $\frac{E_\phi}{E_\theta} = \frac{AB}{AD}$

$$= \frac{\text{Heat received along AB}}{\text{Heat received along AD}} = \frac{\text{Heat received along AB}}{\text{Heat received along AC}}$$

since CD is an adiabat and area ACD is very small. Thus $\frac{E_\phi}{E_\theta} = \frac{K_p d\theta}{K_v d\theta}$ where K_p , K_v are the specific heats at constant pressure and constant volume respectively.

$$\therefore \frac{E_\phi}{E_\theta} = \frac{K_p}{K_v} = \gamma \text{ (say).}$$

Difference of specific heats.—Consider the cycle ACB in Fig. 4. The heat taken in by the working substance is $K_v d\theta$ along AC, and $L dv$ along CB. L is the latent heat of dilatation. Heat $K_p d\theta$ is given out along BA. The algebraic sum of the heat taken in is equal to the work done, i.e. to area ACB. This area is negligible. Thus $K_v d\theta + L dv - K_p d\theta = 0$. For a perfect gas $L = P$ (the pressure) and $PV = R\theta$. Differentiating we have that $P dv = R d\theta$.

$$\therefore K_v d\theta + P dv - K_p d\theta = 0.$$

$$\therefore K_p d\theta - K_v d\theta = R d\theta, \text{ i.e. } K_p - K_v = R;$$

$$\therefore K_v = \frac{R}{\gamma - 1}.$$

Work done during an isothermal expansion.—The work done in any expansion is $\int p dv$. If the body (the gas) expands from v_1 to v_2 the work

done is $\int_{v_1}^{v_2} p dv$. Now $PV = \text{constant}$,

$$\therefore \text{work done} = \int_{v_1}^{v_2} \frac{p dv}{v} = P_1 V_1 \int_{v_1}^{v_2} \frac{dv}{v}$$

$$= P_1 V_1 \log_e \frac{V_2}{V_1} = RT \log \frac{V_2}{V_1}$$

An amount of heat equal to the above must be supplied to the gas in the expansion since it is isothermal.

Adiabatic expansion.—We have shown that $\frac{E_\phi}{E_\theta} = \gamma$. Now $E_\phi = \frac{v dp}{dv}$,

for adiabatic expansion. For isothermal expansion the same term holds,

$E_\theta = \frac{v dp}{dv}$. In an isothermal expansion the equation $PV = RT = \text{constant}$ is valid also. Differentiating we get $P dv + v dp = 0$. Thus $-\frac{v dp}{dv} = P = -E_\theta$.

$$\therefore E_\phi = \frac{v dp}{dv} = \gamma E_\theta = -\gamma P.$$

For an adiabatic expansion, then, the

equation $\frac{v dp}{dv} + \gamma P = 0$ holds. The solution of the equation is $PV^\gamma = \text{constant}$, and this is the equation for adiabatic expansion.

Applications to change of state in solutions.—If a substance can exist, under suitable pressure and volume, in two states, the indicator diagram shows that the isothermals are horizontal. Take water and steam as an illustration. In Fig. 5 AB is the

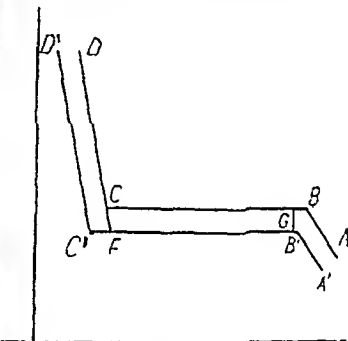


FIG. 5

isothermal for steam at θ° (approximately 100°C). At B water begins to form. BC is the isothermal for a mixture of steam and water. At C all steam is condensed, and CD is the isothermal for water. $A'B'C'D'$ is a similar curve for $\theta + d\theta$. From C and B take adiabatics BG and CF. Consider unit mass, 1 gram, of the water taken round the cycle CBB'F. Let v_2 and v_1 be the specific volumes of water and steam. Heat taken in along CB is L , the heat of evaporation at θ° . The efficiency is $\frac{W}{H} = \frac{d\theta}{\theta}$. Thus

$$\text{work done} = \frac{H d\theta}{\theta} = \text{area CBB'F}.$$

This area is equal to $(v_2 - v_1) dp$, since it is approximately a parallelogram. Therefore $(v_2 - v_1) dp = \frac{L d\theta}{\theta}$;

$\therefore \frac{L}{\theta} = (v_2 - v_1) \frac{dp}{d\theta}$, the well-known equation for the latent heat. If $v_2 > v_1$, $\frac{dp}{d\theta}$ is positive and *vice versa*. Thus for steam the boiling point rises with pressure.

Entropy.—If at a temperature θ a body takes in heat H , there is said to be a change of entropy $\frac{H}{\theta}$. We proved in the paragraph on Kelvin's scale that $\frac{Q_S}{\theta_S} = \frac{Q_R}{\theta_R}$, etc. Thus when we pass from one adiabatic to another along any isothermal the change in entropy is the same. This change of entropy is used to distinguish adiabatics, just as change of temperature is used to distinguish isothermals. No heat is lost or absorbed when a body expands adiabatically. Thus an adiabatic is a line of constant entropy. It is a universal law that entropy is tending to a maximum. In any change of heat energy from one body to another there is gain, never loss, of entropy. For example, suppose a warm body is placed into contact with a cold body until they finally attain the same temperature θ . Let the warm body lose heat Q to the colder body. The loss of entropy by the hot body is $< \frac{Q}{\theta}$, because its average temperature is $> \theta$. The gain of entropy of the cold body is $> \frac{Q}{\theta}$ since its average temperature is $< \theta$. Thus altogether there is gain of entropy.

Expression for work done in terms of entropy.—Work done in Carnot's cycle $= W = Q_1 - Q_2$, where Q_1 is the units of heat absorbed at θ_1 , and Q_2 those at θ_2 . Let ϕ_1, ϕ_2 be the entropies corresponding to the two adiabatics in Carnot's cycle. Then $\phi_1 - \phi_2 = \frac{Q_1}{\theta_1} = \frac{Q_2}{\theta_2}$, \therefore work done $= Q_1 - Q_2 = (\theta_1 - \theta_2)(\phi_1 - \phi_2)$.

Temperature-entropy diagrams.—The condition of a substance is often suitably defined by its entropy and temperature, and not by its pressure, volume and temperature. Equal increments of entropy are marked along the horizontal axis, and temperature along the vertical axis. Fig. 6 shows a Carnot's cycle on this diagram. As stated before, the adiabatics BC and DA are lines of constant entropy or isentropics. The isothermals are of course horizontal. We get, then, such a cycle as ABCD. Work done in the cycle $= (\theta_1 - \theta_2)(\phi_1 - \phi_2) = \text{area ABCD}$. Entropy-temperature diagrams are of use in determining

the efficiency of steam-engines working under various conditions. For a fuller account of these methods, readers are advised to consult such works as Rankine's *Steam Engine*.

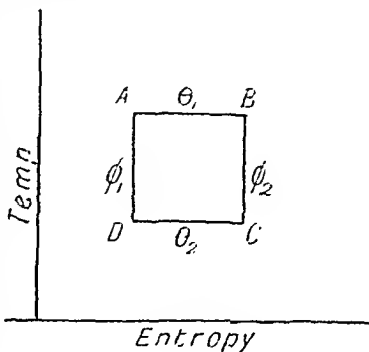


FIG. 6

Application of the principles of entropy to thermodynamical problems.—For a reversible cycle $\int \frac{dQ}{\theta}$ is 0, because $\frac{Q}{\theta}$ is constant at all parts of the cycle. Another expression for the latent heat of water can be obtained from the entropy-temperature diagram. Let a gram of water be taken round the same cycle as in Fig. 5. We proved before that the work done in the cycle CBB'F in Fig. 5 was $\frac{L d\theta}{\theta}$. Fig. 7 is an entropy-temperature diagram for steam and water, under the same conditions as

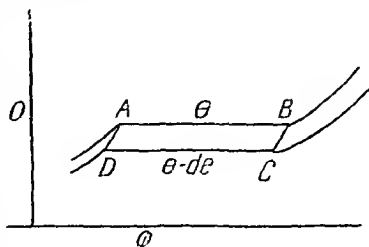


FIG. 7

before. Heat taken in along AB (Fig. 7) is L . That given out along CD is $(L - \frac{dL d\theta}{d\theta})$. The heat taken in along DA is $C_1 d\theta$, where C_1 is the specific heat of the substance in the first state. The heat given out along BC is $C_2 d\theta$, where C_2 is the specific

heat of the substance in the second state. Thus total heat taken in is $(\frac{dL}{d\theta} + C_1 - C_2)d\theta$. The area of ABCD is $\frac{Ld\theta}{\theta}$, and this is also the heat taken

in, $\therefore \frac{dL}{d\theta} + C_1 - C_2 = \frac{L}{\theta}$. This is the second latent heat equation. Of recent years the science of thermodynamics has been vastly employed in problems of radiation. For these more advanced problems the reader is referred to the original papers in the *Phil. Trans.* and elsewhere.

Thermo-electricity, see ELECTRICITY.

Thermograph, an instrument used for automatically recording the fluctuations in the temperature of the air. The 'Richard' pattern of thermograph consists of a curved metal tube containing a suitable liquid. Rise or fall of temperature respectively straightens or increases the curvature of the tube by the alteration in the volume of the liquid. The movement is transmitted by levers to a pen, which makes a trace on a revolving drum. The photographic thermograph of the Meteorological Committee consists of a revolving drum of prepared paper on which is photographed the position of a bubble of air introduced into the mercury column and which moves up and down with the temperature.

Thermometer and Thermometry. The thermometer is an instrument for measuring temperature (*q.v.*). Galileo was the first to use one, but his was not sealed. Ferdinand II., Grand Duke of Tuscany, was the inventor of a sealed and graduated thermometer. He filled a bulb and tube with alcohol and sealed off the latter whilst the alcohol was warm. Mercurial thermometers made their appearance about 1655. Fahrenheit constructed his thermometer, the pattern of which has survived to this day, in 1714. His zero point was found by immersing the thermometer in a mixture of ice and sal-ammoniac. He found the freezing point of water by immersing the thermometer in a mixture of ice and water. He also determined the boiling point of water and the blood temperature of human beings. The boiling point of water he called 312°, the freezing point was then 32°. The intermediate space between these points he divided into 180 equal parts. The Fahrenheit scale is still in general use. Two other thermometer scales are frequently used: (1) Réaumur's scale, and (2) Centigrade scale. Réaumur took the freezing point of water as zero and the

boiling point as 80° on his scale. The intervening space he divided into 80 equal parts and called them degrees. The Centigrade scale was made by Celsius, and is used by scientific men all over the world. The freezing point of water is taken as the zero and the boiling point as 100°. As usual the intervening space was divided equally into 100 degree parts. Fig. 1 shows a comparison of the three scales.

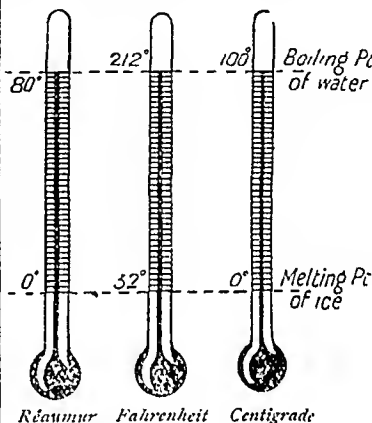


FIG. 1

Construction of a mercury-in-glass thermometer.—When mercury is heated it expands. If a method of measuring this expansion is obtained, the temperatures corresponding to any increase of volume can be defined. To construct a thermometer for accurate measurements, a capillary tube of uniform bore is selected. The smaller the bore the more sensitive the thermometer is, but it adds to the difficulty of cleaning, filling, etc. The tube is first thoroughly cleaned and a bulb blown at one end. The size of this bulb is adjusted by the experience of the glass blower. The larger the bulb the more sensitive is the thermometer, but the walls of the bulb must be strong. The next process is to fill the bulb with mercury. The bulb is heated to expel some of the air, and the open end of the tube placed under mercury. As the air in the bulb cools, it contracts, and some mercury is drawn into the tube and bulb. The tube is then gently warmed, bulb downwards, until the mercury boils and its vapour fills the bulb and tube. On again inverting the tube over mercury and allowing to cool, the bulb should be completely

filled with mercury. If not, the bulb must be heated again. The tube is then drawn out near the end until the bore is almost closed. The mercury is warmed until it flows past the narrow part, and the latter rapidly heated to send it off. The thermometer is then put away for a year or so to completely contract and get 'cured.' The thermometer must then be graduated. It is immersed as completely as possible in a mixture of ice and water. The mixture will be at 0°C . When the column of mercury has become settled, a mark is placed on the tube opposite to the top of the mercury meniscus. The thermometer is then put aside for a short time, and then immersed completely in the steam issuing from boiling water. A mark as before is placed on the tube.

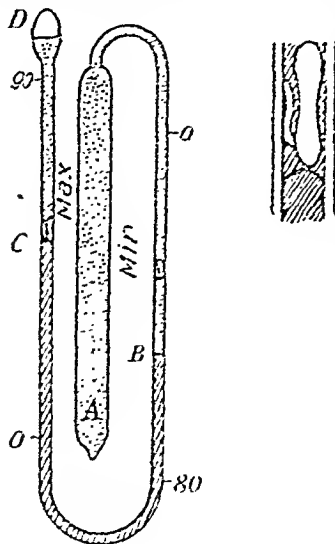


FIG. 2

These marks give the lower and upper fixed points of the thermometer. If it is to be of Centigrade, the intervening space is divided into 100 parts, or graduated by comparison with a standard thermometer. The thermometer is then ready for use. Alcohol is often used instead of mercury in thermometers, but owing to its small range (it boils at 78°C .) it is not so useful, although it is more sensitive than mercury.

Types of thermometers.—We have already described the Fahrenheit, Reaumur, and Centigrade thermometers. Fig. 2 shows a diagram of Six's

self-registering thermometer, which is the oldest of its kind. The bulb A is filled with alcohol or some such liquid, and this extends to B. BC is a thread of mercury with surfaces at B and C. Above C more alcohol is placed. The tube CD ends in a bulb D, in which there is a space for the expansion of the alcohol. Two steel springs, indices (see side diagram), are placed one above each end of the thread BC. They are just strong enough not to slip. When the temperature rises, the alcohol expands and pushes forward the mercury column BC, and the index at C. When it cools again the index at C is left behind. Thus this index marks the maximum temperature attained. As the temperature falls, the alcohol in A contracts and the end B rises, pushing the index with it. When it expands again this index is left behind and marks the minimum temperature.

Fig. 3 is a diagram of Rutherford's maximum and minimum thermometer. It consists really of two separate thermometers. The maximum thermometer, on the right, is filled with mercury. As the temperature rises the mercury meniscus pushes an index before it. This is left behind to mark the maximum temperature, as the temperature falls again. The minimum thermometer, on the left, is filled with alcohol.

Below the surface of the alcohol is placed an index, which is kept below the surface by the surface tension of the alcohol. But it is left behind when the surface of the alcohol rises and so gives the minimum temperature. In Negretti and Zambra's maximum thermometer there is a constriction in the tube close to the bulb. As the temperature rises the mercury is forced past this constriction, but on subsequent cooling it is left behind. The upper end of the column thus reads the maximum temperature attained. Clinical thermometers are constructed in much the same manner (i.e. thermometers for reading the temperature of the human body). In Phillip's maxi-



FIG. 3

imum thermometer, a short thread of mercury is separated from the rest by a small air bubble. This thread is pushed forward as the temperature rises, but remains *in situ* as the temperature falls, and thus indicates the maximum temperature. This thermometer is used in deep-sea sounding, etc., being very stable. The hypsometer is a combination of thermometer and water-boiling apparatus. It is known that the boiling point of water varies at different altitudes. This variation is of use in determining the heights of mountains by finding the boiling point at the top. The hypsometer is the instrument used, and is very strong and portable.

Gas thermometers.—A gas constitutes a much more sensitive thermometric fluid than any liquid, for two reasons: (1) Its specific gravity is low and it can be obtained at a definite standard of purity, and (2) its coefficient of expansion is large. There are two types of gas thermometer (air is usually used)—(1) The constant-volume air thermometer, (2) constant-pressure air thermometer. Jolly's is the simplest form of constant-volume air thermometer (Fig. 4).

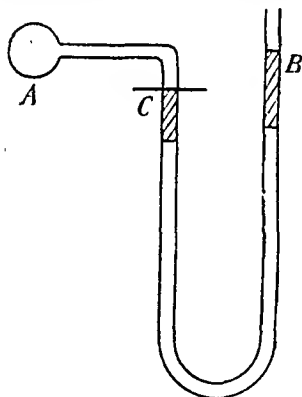


FIG. 4

A glass bulb A of dry air is connected to a glass tube B by a flexible tube. Mercury fills the flexible tube and part of B. The level of mercury is kept fixed in one limb, i.e. at C. The volume of air in A is thus constant. The difference of level of mercury at C and at B gives a measure of the pressure. The pressure is determined for the temperatures of melting ice, 0°, and steam from boiling water, 100°. The instrument can then be graduated to

give a temperature between 0° and 100° by simply reading the pressure. Air expands by $\frac{1}{273}$ of its volume for each degree rise in temperature. The stem of a constant-pressure thermometer is graduated downwards.

air should have no volume at -273° C. This, then, is the zero. This zero is found to agree with that on Kelvin's scale. The constant-pressure thermometer is similar to that shown on Fig. 4, except that the stem is graduated and the mercury is brought to the same level in the two arms before a reading is taken. For most accurate scientific work, the platinum resistance thermometer is most serviceable. This instrument was devised by Sir W. Siemens and perfected by Callendar and Griffiths. The latter two found that pure platinum, when free from strain, always had the same specific resistance at the same temperature. The resistance of platinum wire is not permanently altered by heating or cooling. Its resistance increases uniformly with increase of temperature. If R is the resistance at temperature θ and R_0 that at 0° C., $R = R_0(1 + a\theta)$, where a is the coefficient of increase of resistance. This platinum wire is well suited for a standard. In the platinum thermometer, a coil of wire is wound around a mica framework. It is well protected from chemical action of the atmosphere by means of a hard glass or porcelain tube. The resistance of the wire is ascertained by a Wheatstone-bridge method (q.v.) for several known temperatures and its resistance calibrated. The thermometer resistance is thus a measure of the temperature. The advantage of this thermometer is that it is permanent, is remarkably free from errors, and can be employed over a very wide range. It is of interest to note that a , the coefficient of increase of resistance, is $\frac{1}{273}$. Thus the resistance of the platinum would be zero at -273° C. If, then, the resistance of the wire were found at 0° and 100° in the usual way, we could obtain a platinum scale by dividing the difference of resistance into 100 parts and let each part correspond to a degree. Such a scale would have the same zero, -273° C., as a gas scale, but the individual readings on both scales do not quite agree. For a fuller description of the evolution and use of the platinum thermometer, the reader is advised to look up the original papers of Callendar and Principal Griffiths. Thermopylae, often called simply Pylae, a celebrated pass leading from Thessaly into Locris. The pass of T. is especially celebrated on account

of the heroic defence of Leonidas against Xerxes.

Theron (d. 472 B.C.), a tyrant of Agrigentum, the son of Ænesidemus. He seized the reins of government about 488, and strengthened his position by marrying his daughter to Gelo. With this ally he won a great victory over the Carthaginians at Himera in 480.

Thesaurus, see DICTIONARY.

Theseus, the great legendary hero of Attica, was the son of Ægeus, King of Athens, and of Æthra, the daughter of Pittheus, King of Træzen. He was brought up at Træzon, and when he reached maturity he took, by his mother's directions, the sword and sandals, the tokens which had been left by Ægeus, and proceeded to Athens. Eager to emulate Hercules, he went by land, displaying his prowess by destroying the robbers and monsters that infested the country. By means of the sword which he carried, Theseus was recognised by Ægeus, acknowledged as his son, and declared his successor, to the exclusion of the sons of Pallas. The capture of the Marathonian bull, which had long laid waste the surrounding country, was the next exploit of Theseus. After this he went of his own accord as one of the seven youths whom the Athenians were obliged to send every year, with seven maidens, to Crete, in order to be devoured by the Minotaur. When they arrived at Crete, Ariadne, the daughter of Minos, became enamoured of Theseus, and provided him with a sword with which he slew the Minotaur, and a clue of thread by which he found his way out of the labyrinth. Having effected his object, Theseus sailed away, carrying off Ariadne. He was generally believed to have had by her two sons, Cleopion and Staphylus. As the vessel in which Theseus sailed approached Attica, he neglected to hoist the white sail, which was to have been the signal of the success of the expedition; whereupon Ægeus threw himself into the sea. Theseus thus became King of Athens. One of the most celebrated of the adventures of Theseus was his expedition against the Amazons. He is said to have assailed them before they had recovered from the attack of Hercules, and to have carried off their queen, Antiope. The Amazons in their turn invaded Attica, and the final battle in which Theseus overcame them was fought in the very midst of the city. Theseus was said to have had, by Antiope, a son named Hippolytus, and after her death to have married Phædra. Theseus figures in almost all the great heroic expeditions.

He was treacherously slain by Lycomedes.

Thesiger, Frederic, see CHELMSFORD, FREDERIC THESIGER.

Thesmophoria, a festival in honour of Demeter as the founder of agriculture and patroness of marriage, celebrated widely in Greece and especially at Athens. It was held for five days in the month Pyanepsion (early November), only married women of Attic birth and stainless character taking part. On the first day of the feast (*Struva*) there was a procession to the deme or township of Halimus. See Preller, *Demeter and Persephone*, p. 335 (1887); Mommsen, *Heortologie*, p. 287; Harrison, *Prolegomena to the Study of Greek Religion*, 1908; Scholien on Lucian, *Dial. Meretr.*, ii. 1, published by Rohde, 1870; Smith, *Dict. of Antiq.*, 1891. See MYSTERIES.

Thespia, an ancient Greek city near the base of Mt. Helicon, in Boeotia. Its history seems guided by an inveterate hatred for the neighbouring and stronger city of Thebes, which dismantled its walls in 423 B.C., captured it in 372 B.C., and finally razed it to the ground. In 480 B.C. T. did not disgrace itself by mediating to the Persians. This city was the proud possessor of the beautiful 'Eros' of Praxiteles which the sculptor gave to Phryne, his mistress.

Thespis, the father of Greek tragedy, lived during the latter part of the 6th century B.C. His alteration in the old tragedy connected with the Dionysian festivals was the introduction of an actor, for the sake of giving rest to the chorus. This actor took various parts in the same piece under various disguises, which took the form of linen masks. See Haigh's *Tragic Drama of the Greeks*.

Thesprotia, or Thesprotis, in ancient geography, a district of S.W. Epirus, near the sea. Theopompus (4th century B.C.) makes the Thesproti, one of the principal Epirot tribes, live in the region N. of the Ambracian Gulf. In Thesprotia were the colonies of Elatria, Bacteta, and Pandosia, established from Elis, and the other important towns were Cassope and Ephyra, afterwards Cichyrus.

Thessalonians, The Epistles to the, were probably written by St. Paul from Corinth at the time when he was working there with Silvanus and Timothy (Acts xviii. 5) between 51 and 53 A.D. They are, therefore, among the earliest of St. Paul's epistles, and their genuineness is universally acknowledged. In Acts xvii. we read of St. Paul's visit to Thessalonica, and of the had reception he received from the Jews. The Greeks and devout women, however, showed much eagerness to learn his message,

and to them he turned. The Epistles, then, which follow each other closely, are addressed to a Gentile audience. The immediate occasion of the First Epistle is the favourable intelligence brought to the Apostle by Tim of the steadiness with which Thessalonians adhered to the in spite of the persecutions with which they were assailed by their own countrymen. From it we learn what had been St. Paul's message and appeal when he was himself in Thessalonica. He had appealed to the primary feelings of the human heart and then passed on to speak of Jesus 'which delivereth us from the wrath to come' (i. 10). This particular insistence on the Judgment and the Second Advent had led to much questioning, and in the latter part of the letter St. Paul deals with these. His letter, however, did not settle all difficulties, though the news which St. Paul later received from Thessalonica was in many aspects encouraging. The expectation of the immediate coming of the Lord still caused great excitement and the neglect of the duties of daily life. The Second Epistle is intended to allay this excitement. See article in Hastings' *Dictionary of the Bible* and Cuthbert Lattey's translation of the Epistles to the Thessalonians (1913).

Thessalonica, see SALONICA.

Thessaly, the largest div. of Greece. Thessaly Proper is a vast plain shut in on every side by mountain barriers, broken only at the N.E. corner by the valley and defile of Tempe, which separates Ossa from Olympus. This plain is drained by the R. Peneus and its affluents. In addition to the plain already described, there were two other districts included under the general name of Thessaly; one called Magnesia, being a long narrow strip of country extending along the coast of the Ægean Sea from Tempe to the Pagasan Gulf, and the other being a long narrow vale at the extreme S. of the country, lying between Mts. Othrys and Oeta. Thessaly Proper was divided in very early times into four districts or tetrarchies, a division which we still find subsisting in the Peloponnesian War. These districts were: (1) Hestiotis, the N.W. part of Thessaly; (2) Pelasgiotis, the E. part of the Thessalian plain; (3) Thessaliotis, the S.W. part of the Thessalian plain; (4) Phthiotis, the S.E. of Thessaly. Besides these there were four other districts, viz.: (5) Magnesia; (6) Dolopia, a small district bounded on the E. by Phthiotis, on the N. by Thessaliotis, on the W. by Athamania, and on the S. by Oeta; (7) Oeta, a district in the upper valley of the Spercheus; and (8) Malis. The Thes-

salians were a Thesprotian tribe, and invaded the W. part of the country, afterwards called Thessaliotis, whence they subsequently spread over the other parts of the country. The separate cities being the power being in the hands of a few great families descended from the ancient kings. Of these, two of the most powerful were the Aleuadae and the Scopadae. The Thessalians never became of much importance in Grecian history. In 344 B.C. Philip completely subjected Thessaly to Macedonia. The victory of T. Flamininus at Cynoscephalae, in 197, again gave the Thessalians a semblance of independence under the protection of the Romans.

Thetford, a market tn., 31 m. W.S.W. of Norwich, at the junction of the Thet with the Little Ouse, in Norfolk and Suffolk, England. Castle Hill is a large earthwork of antiquity. Pop. (1911) 4778.

Thetis, in ancient Greek mythology, a sea-goddess, daughter of Nereus and Doris, and mother of Achilles. So beautiful was she that gods as well as men sought her in marriage, Jupiter himself being among her suitors, though he withdrew on learning that she should have a son who should become greater than his father. She was married at length to Peleus. During the Trojan War she appealed to Jupiter on behalf of her son Achilles to give success to the Trojan arms, which Jupiter consented to do.

Theuriet, André (1833-1907), a French novelist and poet, born and educated at Marly-le-Roi in the dept. of Seine-et-Oise. He entered the Finance Department in 1857. His early works were poems, among which may be mentioned: *Le Chemin des Bois*; *Le Bleu et le Noir*; *Le Livre de la Paysse*; and *Jardin d'Antonine*. He also wrote a one-act verse drama, entitled *Jean-Marie*. Among his numerous novels may be mentioned: *Mademoiselle Guignon*, 1874; *Le Filicul d'un Marquis*, 1878; *Flavie*, 1895; *L'Oncle Scipion*, etc.

Thévenot, Jean (1633-67), a French traveller, said to be the nephew of the above. He made extensive travels through Europe (1652-55), and then set out for the East (1655-59, 1663-67), and published an account of his travels in three volumes.

Thévenot, Melchisedec (1621-92), a French scientist, who suggested the founding of the Académie des Sciences (1666). He published *Voyages* (1666-72), a collection of travels and discoveries, and *Recueil de Voyages* appeared in 1683.

Thian-Shan, see TIAN-SHAN.

Thibaudin, Jean (1822-1905), a

French general, born at Moulins-Engilbert, Nièvre. After serving for some time in the Franco-German War he was captured at the battle of Metz, but escaped to France.

Thibaut, Anton Friedrich Justus (1772-1840), a German jurist, born at Hameln, and after studying at Göttingen, Königsberg, and Kiel, was appointed professor of civil law at the last-named university in 1798. In 1802 he moved to Bonn, and four years later to Berlin, where he remained. He published *Theorie der logischen Auslegung des Römischen Rechts* (1799), etc.

Thibaut IV. (1201-53), Count of Champagne and King of Navarre. On the death of Louis VIII., a league was formed by a number of the most powerful French nobles to prevent Blanche, the queen, from acting as regent. T. was at the outset a party to this confederacy, but soon abandoned it, which greatly incensed the Duke of Bretagne and his coadjutors, and they soon after formed the project of harassing him by supporting the claims of the Queen of Cyprus upon Champagne and Brice. Louis IX. marched to the assistance of T., and a compromise was arranged. The poems attributed to T. are in number sixty-six.

Thibaw, or Hsipaw, a Shan state of Upper Burma, with an area of 5080 sq. m., traversed by the Namtu. Rice, cotton, and tea are the chief articles of produce. Pop. 105,000.

Thibet, see TIBET.

Thielen, Jan Philip van (fl. 17th century), lord of Cowenburg, a painter, was born at Mechlin, and became a pupil of Daniel Segers. His best pictures are of St. Bernard and St. Agatha.

Thielt, a tn. of W. Flanders, Belgium, 15 m. S.E. of Bruges. It is an ancient town, and was largely destroyed by fire in 1383. It has a linen-weaving industry, and manufactures textiles. There is an old cloth-hall and a fine bellry. Pop. 12,006.

Thierry, Jacques Nicolas Augustin (1795-1856), a French historian, born at Blois. On leaving school he became the secretary of Saint-Simon, at whose suggestion he published his first work, *De la Réorganisation de la Société Européenne*. His *Histoire de la Conquête de l'Angleterre par les Normands* (1825) cost him his eyesight. His other publications include: *Récits des Temps Mérovingiens*, 1840, and *Recueil des Monuments inédits de l'Histoire du Tiers Etat*, 1850-70.

Thiers, a tn. of dept. Puy-de-Dôme, Franco, on R. Durole, 25 m. N.E. of Clermont-Ferrand. There are important manufs. of cutlery and hank-note paper. Pop. 17,400.

Thiers, Louis Adolphe (1797-1877), a French statesman and historian, born at Marsailles of humble parentage. In 1821 he entered the offices of the *Constitutionnel*, his articles in which quickly placed him in a position of independence. Journalism not satisfying his ambition, he collaborated with Felix Bodin in the production of a *History of the Revolution* (the greater part of which was the work of T.). In 1830, his antipathy to the Bourbons prompting him to seek a more vigorous polemical field than that of the *Constitutionnel*, he founded the *National*. After the nomination of Louis Philippe as King of Franco, T. was rewarded for his publicist services by being nominated a councillor of the state and a post in the Treasury. Later he became Under-Secretary of State to the Treasury (1831), supporting the peace policy of Casimir Périer. Was Minister of the Interior in Soult's cabinet of 1832 during the Paris insurrection, the sanguinary suppression of which has left an ineffaceable blot upon his name. In 1836 he was placed at the head of the cabinet, and carried out, among other liberal reforms, the suppression of lotteries and gaming houses, and the reduction of tariff duties on inland trade. In 1840 he became President of the Council and Foreign Secretary. He supported Mehmet Ali against Turkey with the object of assuring to the latter the retention of Egypt, and later, after the conclusion of peace between England, Russia, Turkey, Prussia, and Austria, he made all preparations for war as a demonstration against the exclusion of Franco from the European concert, but his policy only resulted in the prompt recalling of the French fleet from Turkish waters and his own retirement. He then devoted himself to writing historical works, and published his huge work, the *History of the Consulate of the Empire*. After the proclamation of the republic on the fall of Louis Philippe's government, he made strenuous efforts to overthrow the republic while appearing to support it, but his reactionary efforts only caused him to be banished from French territory on the subsequent restoration of the empire, whither he did not return till 1852. In 1863 he was nominated deputy for one of the divisions of Paris. On the fall of the empire following upon the debacle at Sedan, he was elected President of the Assembly, and shortly after became President of the republic. In 1873, wishing to avoid being made the instrument of monarchist intrigue, he voluntarily resigned. Other works of his are: *The Monarchy from 1830*; *The Law of Property*,

1848; *Saint Helena*, 1862; *Communism*, 1849.

Thigh, the part of the lower limb between the pelvis and the knee. The T. bone, or *femur*, is the longest bone in the human body, constituting about .275 of the height from sole to crown. It articulates with the os *innominatum* above, and with the *tibia* below.

Thingvalla-vatn, one of the largest lakes of S.W. Iceland, situated about 21 m. E. of Reykjavik. It is 11 m. long, and its greatest width is 6 m. Area 30 sq. m.

Thionville, see **DIEDENHOFEN**.

Thiophene (C_4H_4S), a sulphur compound contained in impure coal-tar benzene. It resembles benzene closely in chemical and physical properties, and can only be separated from it by repeated treatment with sulphuric acid. With sulphuric acid and a trace of isatin, T. gives a beautiful blue colouration.

Thirlage, in Scots law, is that servitude by which possessors of lands in some parts of the country are bound to grind their grain at a particular mill—to which mills the lands are said to be 'astriected' or 'thirled.'

Thirlmere, a lake of the Lake District, Cumberland, England, $3\frac{1}{2}$ m. S.S.E. of Keswick. It is 3 m. in length and about $\frac{1}{2}$ m. in width, with a depth of nearly 100 ft. It is surrounded by lofty heights; on its E. shore rise Helvellyn and Whiteside, whose slopes are well wooded, while on its W. side are Armboth Fells and Raven Crag, whose slopes are bare and cut by mountain torrents. T. affords the water supply of Manchester.

Thirlwall, Connop (1797-1875), an English divine and historian, born in London; was educated at the Charterhouse, London, and Trinity College, Cambridge, and was called to the bar in 1825; but the law not attracting him he took holy orders in 1827, and became tutor and lecturer at Cambridge until 1834, when he was given the living of Kirby Underdale. In 1840 he was appointed by Melbourne to the see of St. David's. He translated works by Tick, Schleiermacher, and Niebuhr into English, and wrote several books. His masterpiece was his *History of Greece* (1835-44).

Thirsk, a market tn. of the N. Riding of Yorkshire, England, 11 m. N.E. of Ripon. Its fairs and markets are noted, and a trade is carried on in corn, wool, timber, etc. Pop. (1911) 3100.

Thirst, a desire for drink, made known by sensations projected to the pharynx. The amount of water contained in the body is subject to great

changes. It is always being lost by various organs, the amount lost varying greatly with the conditions of life. This loss directly affects the blood, but this is not lasting, as the blood draws upon the vast resources of the other body tissues for its supply of water, consequently the tissues require a new supply to restore them to their normal state. The sense of T. then comes into play; we become thirsty and take into our bodies water in varying quantities according to our needs. Little is known concerning the nervous mechanism controlling this sensation, but it is assumed that when the water content falls below a certain amount the nerves in the pharyngeal region are stimulated and so give rise to T.

Thirty-nine Articles, *The*, of the Church of England are described in their heading as 'Articles agreed upon by the archbishops and bishops of both provinces and the whole clergy, in the Convocation holden at London in the year 1562, for the avoiding of diversities of opinions, and for the establishing of consent touching true religion.' Their history, however, begins before this date. On the death of Henry VIII., the government of the country was left in the hands of a group of nobles, of whom almost all were in favour of the reformed doctrines, and the changes in the teaching and practice of the Church increased with great rapidity. The ancient landmarks were being removed, and it was desirable that fresh ones should be set up. In 1549, Parliament empowered the king to appoint a commission for the drawing up of ecclesiastical laws, and in accordance with this Act a commission was appointed in 1551 consisting of eight bishops, eight divines, eight lawyers, and eight other representatives of the laity. This commission, which included Cranmer, Ridley, Coverdale, and Peter Martyr, began by drawing up a code of forty-two articles which were published by royal authority in 1553. It seems probable that Strype and Burnet are wrong in making it appear that these articles had also behind them the authority of the Convocation of 1552. To these articles was prefixed Cranmer's *Catechism*. In the same year Edward VI. died, and the Convocation of the first year of Mary denied that the articles had received their consent, and entirely repudiated them. The tide of reformation was thus stemmed for a while, but on the accession of Elizabeth it was resumed. This period is marked by greater moderation. Parker occupied the see of Canterbury, and he submitted

to Convocation a revised form of the original forty-two articles. These underwent considerable further alterations, in course of which they were reduced in number to thirty-nine, and were finally promulgated in 1571. The first half of the twentieth article was omitted in some copies, and there continued to be some discussion as to which was the authorised form, until in 1604 they were finally settled in the form in which they are now used. The T. A. were adopted by the Convocation of the Irish Church in 1635, and by the Scottish Episcopal Church in 1804. Especially during the last century, controversy has raged as to the nature and meaning of the articles. Some have tried to interpret them as an orderly body of divinity, but they are plainly devised to meet a special need, and bear the marks of compromise in every line. They are, indeed, chiefly negative, condemning the errors of the mediæval Church and those of certain of the Protestant sects. They are, on the whole, Calvinistic in tone, but their extreme elasticity has been well shown by Newman and Jowett. The former of these, in the famous *Tract XC.*, attempted to prove that they were in no way contrary to the Decrees of Trent. Well-known commentaries on the articles are those of Beveridge (1716), Forbes of Brechin (1867, 2nd ed. 1872), and Harold Browne (1850, 12th ed., 1882).

Thirty Years' War, The. Practically it may be said that the T. Y. W. was the result of the German Reformation and the Counter-Reformation. The war began in 1618 by the offer of the crown of Bohemia to the Lutheran prince, the elector of the Palatinate, son-in-law of James I. of England and father of the Princes Rupert and Maurice. The troops of the emperor immediately entered Bohemian territory and drove Frederick out, depriving him also of his electorate of the Lower Palatinate. Incidentally, the inactivity of James I. of England in the Protestant cause inflamed his subjects and was one of the causes of the great unpopularity of the Stuarts. The territories so annexed by the Emperor Ferdinand were handed over to Maximilian of Bavaria and so became Catholic; an illustration merely of the 16th-century principle that the religion of the prince is also the religion of his subjects. The Hapsburgs now developed their policy on larger lines; Germany was to become a Hapsburg possession and the territory lost to Catholicism by the Reformation was to be regained. The imperial generals, Tilly and Wallenstein, swept all before them, N. Germany and the

Baltic ports seemed to lie at their mercy. Christian IV. of Denmark came forward as the champion of German Protestantism, but was defeated and forced to make peace in 1629 (Lübeck). Wallenstein had established the Hapsburg supremacy in the north, but had failed to take Stralsund. In the following year we find Gustavus Adolphus coming forward as the champion of Protestantism, and with his appearance we get the beginning of the end. Wallenstein had been dismissed at the Diet of Ratisbon; the German princes feared the man whom they regarded as a mere mercenary upstart. Gustavus Adolphus marched from victory to victory. His army was the precursor of the principle which held the Ironsides and the Covenanters together. Tilly was defeated at Breitenfeld, and Gustavus marched to the S. In 1631 he again defeated, and killed, Tilly at Lech, and then Wallenstein was recalled. Gustavus won the battle of Lützen (1632), but was killed, and much of his work was undone. From this point practically the religious motives of the war disappear. France, anxious to break the power of the Hapsburgs, gave support to the Swedes and German Protestant princes. Richelieu played his hand well; enemies were raised up to the Hapsburgs in Germany, Italy, and Spain; the Dutch were given support in their struggle against Spanish power; and the power of the Hapsburgs, both Austrian and Spanish, began to decline. The policy of Richelieu was continued after his death by Mazarin, and the French generals, Condé and Turenne, won brilliant victories over the Imperialists. Finally the end came in 1648 when the emperor, suffering from defeats in Germany at the hands of the Swedes and the French, agreed to terms of peace. Peace was signed at Westphalia in 1648 (October). The territorial gains of France and Sweden were recognised, and the independence of the German princes. The attempted revival of the power of Catholicism by means of the edge of the sword had failed, and the imperial power became nominal elsewhere than in Austria. The independence of Portugal and the United Provinces (Holland) was also recognised by this treaty.

Thisbe, see PYRAMUS.

Thistle, a name given to various composite plants of which the best known are those that belong to the genera *Carduus* and *Cnicus*. Others are the Scottish T. (*Onopordon acanthium*); the Carlino T. (*Carlina vulgaris*); the Globe T., which belongs to the genus *Echinops*; and the Hedge-

took out patents. The process was especially valuable abroad. See *Memoirs and Letters* by Bwinie.

Thomas, William ('Islwyn') (1832-8), a Welsh poet, born at Ynyddu in Monmouthshire. He entered the Calvinistic Methodist ministry in 1859, and became famous in Mynyddislwyn as a preacher. He is recognised as one of the best Welsh poets, but his work is marred by his facility, and his influence, though it freed Welsh poetry from the bonds of the Cynghanedd, tended to foster loose writing. Some of his pages, however, reach the heights of poetry. His poems include: *Barddoniaeth gan Islwyn*; *Caniadau Islwyn*. A complete collection was edited by Owen Edwards in 1897 under the title *Gweithiau Islwyn*.

Thomas, Christians of St., the oldest Christian church of India, is Nestorian in doctrine, and probably owes its origin to the Nestorians of Persia. Tradition, however, ascribes it to St. Thomas. From 1599-1653 they were brought under Roman jurisdiction, but they now claim entire independence. They number somewhat less than half a million, and are found in the states of Malabar and Cochin. The liturgical language is Syriac. See G. M. Rac's *Syrian Church in India*, 1892.

Thomas à Becket, see BECKET.

Thomas à Kempis, see KEMPIS.

THOMAS A.

Thomas Aquinas, see AQUINAS.

Thomasius, Christian (1655-1728), a German jurist and publicist, born at Leipzig, where he began to lecture on the law in 1684. He removed to Halle (1690), where he founded a university (1694).

Thomas of Celano, composer of the Latin hymn, *Dies Ira* (q.v.).

Thomas of Woodstock, see GLOUCESTER, DUKES AND EARLS OF.

Thomassiu, Simon (1652-1732), a French engraver, born at Troyes; he lived for a while at Rome, and died in Paris. Besides doing many engraved portraits from life he reproduced various works of the old masters, and also did a series of prints representing the statues in the gardens at Versailles.

Thomassiu, Simon Henri (1688-1740), a French engraver, son of Simon T. (q.v.); born in Paris, he lived there chiefly till his death. He reproduced pictures by De la Fosse, Rigaud, and the younger De Troy, while his prints also include a fine rendering of Watteau's *Harlequin and Columbine*.

Thomas the Rhymer, see ERCILDOUNE, THOMAS OF.

Thomastown, a tn. of Kilkenny co., Ireland, on R. Nore, 9 m. S.E. of

Kilkenny, with flour mills. Pop. (1911) 1300.

Thomasville, cap. of Thomas co., Georgia, U.S.A., 34 m. N.E. of Tallahassee. A winter health resort, and has cotton, lumber, and fruit industries. Pop. (1910) 6727.

Thompson, Sir Benjamin, Count von Rumford (1753-1814), born at Woburn, Massachusetts, and became a major in a provincial regiment, but being imprisoned for lukewarmness in the cause of liberty, ultimately came to England. Here he obtained employment in the Colonial Office, and made various scientific experiments, returning to America in 1782 as lieutenant-colonel of George III.'s American dragoons. He served the elector of Bavaria, 1784-95, during which period he carried out various reforms, and was made head of the Bavarian War Department, and count of the Holy Roman empire. He quitted the Bavarian service in 1799, and returned to London, founding the Royal Institution.

Thompson, Edward (1738-86), an English sailor and poet, was educated at Harrow. He entered the navy in 1755, and took part in the blockade of Brest and the battle of Quiberon Bay. He was also present at the relief of Gibraltar, and was employed in settling Demerara and Essequibo, 1781. He wrote: *The Mercetriad*, 1755(?), an amusing satire; *Trinculo's Trip to the [Stratford] Jubilee*, a boisterous ode, 1769; *A Sailor's Letters*, which depicts the social life of the navy, etc.; *The Syrens*, a two-act masque, and various sea-songs. He also edited the works of Andrew Marvell.

Thompson, Elizabeth and Alice, see BUTLER, ELIZABETH SOUTHERDEN, LADY; and MEYNELL, ALICE.

Thompson, Francis (1860-1907), an English author, born in Preston. He was educated at Ushaw College, near Durham, and afterwards studied medicine at Owens College, Manchester, but failing to take a degree he sought his fortune in London. Here he spent some years in various occupations, until in 1893 he sent a poem to the magazine *Merrie England*. This was at once recognised by Wilfrid Meynell as a work of merit, and he helped Thompson to publish his first volume of *Poems*, which were praised by Coventry Patmore in the *Fortnightly Review*. This volume was followed by *Sister Songs* (1895) and *New Poems* (1897), both of which gave him a recognised place among poets. He also gained a reputation as a prose writer, and published *Health and Holiness*, a treatise dealing with the ascetic life, and an *Essay on Shelley*, amongst other works. Messrs.

Burns and Oates published *The Works of Francis Thompson* (1913) in three volumes. See *Lives* by W. Scawen Blunt (1913) and Everard Meynell (1913).

Thompson, Sir Henry, Bart. (1820-1904), an English surgeon, born at Framlingham, Suffolk. He studied at University College, London, and in 1863 became surgeon there, being appointed professor of clinical surgery in 1866, and consulting surgeon in 1874. He was also professor of surgery and pathology in the Royal College of Surgeons. He was an advocate of cremation, and wrote: *Pathology and Treatment of Stricture of the Urethra; The Enlarged Prostate; Practical Lithotomy and Lithotripsy; Clinical Lectures on Diseases of the Urinary Organs; The Preventive Treatment of Calculus; On Tumours of the Bladder; Food and Feeding; Modern Cremation, its History and Practice.*

Thompson, Sir John Sparrow (1844-94), a Canadian statesman, born at Halifax in Nova Scotia, where in 1877 he entered the House of Assembly. In the following year he was made Attorney-General, and in 1881 Premier, but his administration lasted only a year. He was a judge of Nova Scotia Supreme Court from 1882 till 1885, when he entered the Dominion House of Commons and became Minister of Justice. From 1892 till his death he was Prime Minister of Canada.

Thompson, Silvanus Phillips, F.R.S. (b. 1851), principal and professor of physics in the City and Guilds Technical College, Finsbury; born in York. He was professor of experimental physics in University College, Bristol (1876-85), when he was appointed to his present post. In 1912 he was president of the Optical Conference. His publications include: *Elementary Lessons in Electricity and Magnetism; Light Visible and Invisible; Dynamo-electric Machinery; Design of Dynamos; Electro-magnet Optical Tables; Life and Work of Faraday; Life of Lord Kelvin.*

Thompson, Sir Thomas Boulden, Bart. (c. 1766-1828), a British vice-admiral, born at Barham, Kent. He went to sea in 1778, and served in the W. Indies, and on the coast of S. America, and in 1797 was with Nelson at Teneriffe. He took part in the blockade of Brest (1799), and in 1801 lost a leg in the battle of Copenhagen. He was created a baronet in 1806, and raised to the rank of vice-admiral in 1814.

Thompson, William (1811-80), a pugilist, known as 'Bendigo,' born in Nottingham. He defeated Caunt, Deaf Burko, and Tom Paddock, and

in 1839 was presented with a 'champion's belt' at Liverpool.

Thompson, William Hepworth (1810-86), an English classical scholar, born at York. Having studied at Trinity College, Cambridge, he became professor of Greek there in 1853, being appointed master of his college in 1866. He published editions of Plato's *Phaedrus* and *Gorgias*. He also wrote a dissertation on Plato's *Sophist*, and edited *Lectures on the History of the Ancient Philosophy* by William Archer Butler.

Thoms, William John (1803-85), an English antiquary, born in Westminster. He was a clerk in the secretary's office at Chelsea Hospital for twenty years, after which he became clerk to the House of Lords and its deputy-librarian (1863-82). He published *Early Prose Romances*, 1828; *Lays and Legends*, 1834; *The Book of the Court*, 1838; *Gammer Gurton's Famous Histories*, 1846; *Gammer Gurton's Pleasant Stories*, 1846. He also founded *Notes and Queries*, 1849.

Thomsen, Hans Peter Jorgen Julius (1826-1909), a Danish chemist, passed his life in his native city of Copenhagen, teaching chemistry at the Polytechnic (1847-56) and Military High School (1856-66) before he was appointed to the chair of his science in the University (1866-91). *Thermochemistry* (1908) is an abstract of his *Thermochemische Untersuchungen* (1882-86), in which he gave the results of years of practical research.

Thomson, Allen (1809-84), a Scottish biologist, was professor of physiology at his own University of Edinburgh from 1842-48, resigning that appointment for the chair of anatomy at Glasgow, which he held till 1877. He did much to advance the then youthful science of embryology.

Thomson, Sir Charles Wyville, F.R.S. (1830-82), a Scottish naturalist, occupied several professorial chairs, the last being that of natural history at his own University of Edinburgh (from 1870 onward). In 1868 and 1869 he went on deep-sea dredging expeditions, and from 1872-76 was superintending the scientific staff on the *Challenger* during the deep-sea explorations. T. threw much light on animal life at various depths.

Thomson, George (1757-1851), a musician, born at Limekilns, Mifflinshire, and lived chiefly in Edinburgh till his death, being employed as a clerk by the Board for Encouragement of Scottish Manufactures. He was a friend of Burns, and was director of the first musical festival held in Edinburgh, while he compiled several volumes of Scottish traditional melodies.

Thomson, James (1700-48), a Scottish poet, born at Ednam in Roxburghshire, was educated at Edinburgh University, where he occupied his leisure in writing great quantities of verse, three of which poems appeared in the *Edinburgh Miscellany* of 1820. Faintly intended of intention of . . . but he abandoned . . . and in 1725 went to London to pursue a literary career. He became tutor to Thomas Hamilton (afterwards seventh Earl of Haddington), and made the acquaintance of many of the leading men of letters. He published in 1726 *Winter*, which was highly applauded, and this he followed in the next year with *Summer*. *Spring* appeared in 1728, and two years later he republished these three poems, adding to them *Autumn*, under the title of *The Seasons*. He subsequently carefully revised this work, but it was not brought out in its amended form until 1744. T. in 1730 had his play *Sophonisba* produced at Drury Lane, but in spite of its many merits it was not successful. *Liberty* (1734) and *Agamemnon* (1738) were his next works, and in 1740 he wrote *The Masque of Alfred*, which is famous because therein first appeared *Ride Britannia*. Since 1738 T. had been in receipt of a pension from Frederick Prince of Wales, and in 1744 was given by Lyttelton the sinecure office of surveyor-general of the Leeward Is. His later works include the play *Tancred and Sigismunda* (1745), in which Garrick played Tancred, and *The Castle of Indolence* (1748). He was buried in Richmond Church. When T. began to write, English poetry was dominated by artificiality, and Pope was the principal living poet; but T. introduced the true simple romantic treatment of nature, and his influence on his contemporaries as on his successors was unbounded. T.'s *Works* were first collected in 1763, and have since been frequently reprinted. There are . . . se . . .),

Thomson, James (1822-92), a British physicist, was also an engineer, inventor, and geologist. He was professor of civil engineering at Belfast (1857-73) and Glasgow (1873-89), and was the first to demonstrate the possibility of lowering the freezing-point of water, etc., by pressure.

Thomson, James (1834-82), a Scottish poet, was in early life an army schoolmaster, but was dismissed for a breach of discipline in 1862. His best work, contributed as by 'B. V.' (Bysshe Vanolis), *The City of Dreadful Night*, appeared in the

National Reformer during the spring of 1874, and was published in book form six years later. There is a *Biography* by H. S. Salt.

Thomson, John (1778-1840), a minister of the Church of Scotland and landscape painter, born at Dally, Ayrshire; he was appointed to the Parish Church there in 1799, while from 1805 till the time of his death he was minister at Duddingston, Midlothian.

Thomson, Joseph (1858-95), a Scottish explorer in Africa; was left in 1879, after Keith Johnston's death, in sole charge of an expedition to E. Central Africa. In his book entitled *To the Central African Lakes and Back* (1881) he described the new track he found between lakes Nyasa and Tanganyika and his discovery of Lake Rukwa. His *Through Masailand* (1885) is a record of a caravan journey through that country—the first ever undertaken. In 1890-91 he traversed nearly 1000 m. of the then unknown country, now called N.E. Rhodesia.

Thomson, William McClure (1806-94), an American missionary, sacrificed with brief intervals the years 1833-76 to the work of spreading Christianity in Syria and Palestine. He wrote *The Land and the Book* (3 vols.), 1880-83.

Thomson, William (1819-90), an Archbishop of York, became tutor (1847) and afterwards provost (1855) of Queen's College, Oxford. In 1862 he received his high preferment. Though he was sometimes at variance with the High Church party, he impressed the church-going public with his broad-mindedness and good sense.

Thomson, William, see KELVIN, LORD.

Thonon-les-Bains, a vil. and holiday resort on the S. side of Lake Geneva, in the dept. of Haute-Savoie, France. Pop. 7000.

Thor, god of thunder, see MYTHOLOGY.

Thoracic Duct, a duct which conveys the greater part of the lymph and chyle into the blood. It is the common lymph trunk of the body except for the right upper extremity, right side of the head, neck, and thorax, right lung, right side of the heart, and convex side of the liver. It does not, as its name would seem to imply, lie wholly within the thoracic cavity, but begins in the abdomen, on the front of the body of the second lumbar vertebra, by a dilatation known as the receptaculum chyli. It reaches the thorax by passing through the aortic opening in the diaphragm, passes upwards to the root of the neck, and then takes a curved course outwards and down-

wards, empties itself into the left subclavian vein at its junction with the left internal jugular vein. Thoracic measures, in the adult, between 15 and 20 in. in length.

Thorald, a vil. 25½ m. N.W. of Buffalo, in Welland co., Ontario, Canada. Pop. 2500.

Thorax, in anatomy, the upper portion of the trunk, being contained between the diaphragm below, the ribs and sternum in front, the ribs and part of the vertebral column behind, and the base of the neck above. See CHEST.

Therbecke, Jan Rudolf (1798-1872), a Dutch statesman; went to Leyden University in 1817, and was called to the bar in 1820. After the publication of his *Constitution of the Netherlands* in 1828, he was recognised as a real political force, besides being an accomplished orator and author, and helped largely to shape the constitution finally adopted in 1887.

Thereau, Henry David (1817-62), an American naturalist and author; passed through school and Harvard University without making any impression. The two famous years of his life are those he spent as a recluse in his self-made shanty in the woods near Walden Pond (1845-47), and it is his *Walden* (1854) which reveals to the world the curious and arresting originality of the man. Here he lived happily on a bare pittance, indulging to the full his sympathies with bird and beast, and giving free rein to his fresh and noble but rather egoistic thoughts. Other facts of interest in his life are his intimacy with Emerson, the diversity of his callings, and his contempt for work and wealth.

Thoren, or Thorild, Thomas (1759-1808), a Swedish man of letters; was firstly and lastly an eccentric. In his views on hero-worship and his veneration for Cromwell he resembled Carlyle. His admiration for the English, among whom he lived in 1788, was soon changed to contempt and dislike, and his feelings underwent the same change with regard to the French Revolution. In 1793 he was sentenced to four years' banishment for a revolutionary opinion expressed in his *Essay on the Freedom of the Public Mind*. Some of his poems were punned in English.

Thoresby, Ralph (1658-1725), an English antiquary, born at Leeds. He made an excellent collection of coins, manuscripts, curiosities, etc., one of the finest private collections ever made, and was an early fellow of the Royal Society. He wrote *Ducatus Leodiensis, or the Topography of the*

Town and Parish of Leeds (1715) and *Vicaria Leodensis* (1724).

Thorn, a tn. on the Vistula, 26 m. E.S.E. of Bromberg, in W. Prussia, Germany. Since 1878 it has been converted into a first-class fortress, as it commands a viaduct over the river. In 1853 a monument was erected to Copernicus, who was a native of the town. Timber, cereals, and iron are the chief articles of commerce. Pop. 46,230.

Thornaby-on-Tees (known as South Stockton prior to 1892), a tn. opposite Stockton, and 3 m. S.W. of Middlesbrough, in the N. Riding of Yorkshire, England. The iron industry is of first importance. Pop. (1911) 18,605.

Thorn Apple, see DATURA.

Thornback, or *raja clavata*, a species of skate (q.v.), found off the coast of Britain, and is so named from its spiny upper surface.

Thornbury, George Walter (1828-76), an English man of letters, wrote a *Life of Turner* (1861), the impetuous *Songs of the Cavaliers and Roundheads* (1857), and over twenty novels.

Thorne, a tn. on the Don, with barge-building and rope-making industries, 10 m. N.E. of Doncaster, in the W. Riding of Yorkshire, England. Pop. (1911) 5290.

Thorne, Sir Richard Thorne (1841-99), an English physician, definitely established the fact that water may convey typhoid infection. He urged strongly the erection of isolation hospitals, and in general promoted the science of hygiene and public health. In 1892 he was appointed chief medical officer to the Local Government Board.

Thornhill: 1. A tn. with woollen and shoddy mills, 1½ m. S. of Dewsbury, in the W. Riding of Yorkshire, England. Pop. (1911) 11,305. 2. A picturesque vil. with ruins in the neighbourhood, 11 m. S.S.E. of Sanquhar, in Dumfriesshire, Scotland. Pop. (1911) 1101.

Thornhill, Sir James (1676-1734), born at Weymouth. He received the commission from Queen Anne to paint the interior of the cupola of St. Paul's Cathedral, and afterwards to paint the princess's apartment at Hampton Court. Sir James executed many other large works, as the staircase, the gallery, and several ceilings in the palace at Kensington, a hall at Blenheim, and (with some assistance) the great hall at Greenwich Hospital. Sir James painted also several portraits and some altar-pieces. Sir James was a fellow of the Royal Society, and represented Weymouth in parliament.

Thornton: 1. A vil., 1 m. N. of Poulton station, on the Wyre, in

Lancashire, England. Pop. (1911) 4669. 2. Or Thornton Hall, a station on the Caledonian Railway, 6 m. S. of Glasgow, in Lanarkshire, Scotland. Pop. (1911) 1100.

Thornton, Bonnell (1724-68), an English man of letters, translated some plays of Plautus, contributed essays to the *Connoisseur* (1754-56), wrote an *Ode to St. Cecilia's Day*, which was performed at Ranelagh with Dr. Burney's music, and burlesqued the Royal Academy by opening a rival exhibition of London street signs.

Thornton, Sir Edward (1817-1906), an English diplomatist, graduated from Pembroke College, Cambridge, in 1840. After some years spent in the legation at Mexico and in various S. American embassies, he was in 1867 nominated as ambassador at Washington. Here he stayed till his appointment as British minister at St. Petersburg (1881). He assisted in negotiating the treaty of Washington (1871) and the convention with Russia as to the frontier lines of Afghanistan (1885).

Thorough Bass, a term used for the science of harmonic composition. It is sometimes called *figured bass*, a bass voice part written with numerals below it to indicate the chords of the harmony.

Thorpe, Benjamin (1782-1870), an English Anglo-Saxon scholar, studied for four years under the Danish philologist, Rask, at Copenhagen University. His *Northern Mythology* (3 vols., 1851) makes an appeal to the greatest number of readers, but students derive much benefit from his *Analecta Anglo-Saxonica* (1834), and from his translations of Caedmon (1832) and the elder 'Edda' (1866).

Thorwaldsen, Bertel (1770-1844), a Danish sculptor. The son of a wood-carver, he was born at Copenhagen and studied for a while in the school of art there; subsequently he went to Italy, where he was influenced by Canova. Soon after his death a permanent exhibition of his work was formed at Copenhagen, while his statue of Byron is now at Trinity College, Cambridge. See Eugène Plon, *Thorwaldsen: Sa Vie et ses Œuvres* (Paris), 1880.

Thoth, an Egyptian deity, resembling the Greek god Hermes, and later identified with Hermes Trismegistus. He was the god of magic, science, and invention, and taught the people how to write and calculate.

Thothmes, or Tethmosis, the name of four kings of ancient Egypt, who belong to the 18th dynasty; *Thothmes I.* (c. 1540 B.C.) finally subdued and enlarged Cush and made successful campaigns as far as the Euphrates.

Ho was the first king to be interred in the Valley of the Tombs of the Kings of Thebes. *Thothmes II.*, his son, reigned less than three years. *Thothmes III.*, the son of Thothmes II., did little till the death of his stepmother and aunt, the despotic Queen Hatshepsut. Besides fighting seventeen successful campaigns in Syria and twice capturing Kadesh, he proved a great builder and administrator. *Thothmes IV.* was a grandson of Thothmes III., and ruled till about 1400 B.C. He cleared the Great Sphinx.

Thou (or Thuanus), Jacques Auguste de (1553-1617), a French historian, born at Paris. He became a canon of the Notre Dame in Paris, but he gave up an unecongenial profession, and by 1588 was president of the parlement of Paris, and in great favour with Henry III. He wrote a *Historia sui temporis* in 138 books (1604-20), which is an invaluable historical document. See Lives by Dupuy (1669) and J. A. M. Collinson (1807).

Thouars, a tn. in the dept. of Deux-Sèvres, France, on R. Thouet, 38 m. S.E. of Angers. Part of the mediæval walls are standing, and there are old churches and a castle. A local trade centre. Pop. 6250.

Thouars, Louis M. Aubert du Petit (1756-1831), a French botanist and traveller, born at Bournois, near Saumur. From 1792-1802 he visited Mauritius, Madagascar, and Réunion in company with his brother, Aristide Aubert, a naval commander. He was made director of the Royal Institute of Arboriculture in Paris.

Thought Reading, see PSYCHICAL RESEARCH.

Thoumeysser, Johann Jacob (1636-1718), an engraver, born at Basle. He worked subsequently at Strasbourg and Lyons, but returned to Basle ere his death. He reproduced the works of several minor portrait-painters, and did some fine plates for the *Deutsche Academie der edlen Bau-Bild-und Malerei Künste* (Nürnberg), 1675.

Thourout, a tn. of Belgium, in the prov. of W. Flanders, 12 m. S.E. of Ostend. It has manufs. of woollens, linen, and hats. Pop. 10,800.

Thousand and One Nights, see ARABIAN NIGHTS.

Thousand Islands, the name given to a lake-like expansion of the St. Lawrence R., stretching from Kingston to Brockville, so called from the hundreds of islands which add peculiar charm to the scenery as seen from the shore.

Thracia, was in earlier times the name of the vast space of country bounded on the N. by the Danube.

on the S. by the Propontis and the *Ægean*, on the E. by the Pontus *Euxinus*, and on the W. by the R. *Strymon*, and the easternmost of the *Illyrian* tribes. It was divided into two parts by Mt. *Hæmus* (the *Balkan*) running from W. to E., and separating the plain of the lower Danube from the rivers which fall into the *Ægean*. At a later time the name *Thrace* was applied to a more limited extent of country. *Thrace*, in its widest extent, was peopled in the times of *Herodotus* and *Thucydides* by a vast number of different tribes. The earliest Greek poets, *Orpheus*, *Linus*, *Museus*, and others, are all represented as coming from *Thrace*. The *Thracian Chersonesus* was probably colonised by the Greeks at an early period, but it did not contain any important Greek settlement till the migration of the first *Miltiades* to the country, during the reign of *Pisistratus*. The first really historical fact respecting them is their subjugation by *Megabazus*, the general of *Darius*. After the Persians had been driven out of Europe by the Greeks, the *Thracians* recovered their independence; and at the beginning of the *Peloponnesian War*, almost all the *Thracian* tribes were united under the dominion of *Sitalces*, king of the *Odrysæ*, whose kingdom extended from *Abdera* to the *Euxine* and the mouth of the *Danube*. *Sitalces* fell in battle against the *Trihalli* in 424, and was succeeded by his nephew *Senthes*, who raised his kingdom to a height of power and prosperity which it had never previously attained. *Phillip*, the father of *Alexander the Great*, reduced the greater part of *Thrace*; and after the death of *Alexander* the country fell to the share of *Lysimachus*. It subsequently formed a part of the *Macedonian* dominions.

Thrale, Mrs., see *Piozzi*.

Thrapston, a tn. of *Northamptonshire*, England, on R. *Nene*, 18 m. N.E. of *Northampton*. Iron ore is mined in the vicinity and the town has blast furnaces. It is a market town. Pop. (1911) 1800.

Thrasea, P. *Pætus* (d. 66 A.D.), a Roman senator, and Stoic philosopher, in the reign of *Nero*, a native of *Pannonia*. He made the younger *Cato* his model, of whose life he wrote an account. After incurring the hatred of *Nero*, he was condemned to death by command of the emperor.

Thrashing, the separation of the grain from the straw, or the seed from the *halm*. Formerly, the operation was performed by the *flail*, and the use of this laborious but effective implement appears to be roving on small-holdings. The first workable T. machine was invented by *Andrew*

Meikle about 1786; the modern machine, besides effectively sorting out the products of the sheaf, delivers the straw unbroken and ready for trussing. Steam-power is generally employed, but water-power and even horse-gears are occasionally employed, more especially with fixed machines. The grain is passed by hand or self-feeder into the drum mouth and is threshed out by beaters. The straw is passed out after the grain has been shaken away, by means of riddles and air-blast from a fan and rotary screens which grade the corn. Among the modern improvements and accessories are chaff bagging apparatus, automatic elevator for delivering chaff direct into a *hullding*, and trussing machines for tying the straw into *huddles* as fast as it is delivered.

Thrasimene, see *TRASIMENE*.

Thrasylbulus, a celebrated Athenian, son of *Lyceus*. On the establishment of the Thirty Tyrants at Athens he was banished, but, by the assistance of the *Thebans*, succeeded in overthrowing the Ten, who had succeeded to the government, and eventually obtained possession of Athens, and restored the democracy, 403. In 390 he commanded the Athenian fleet in the *Ægean*, and was slain by the inhabitants of *Aspendus*.

Thrasymachus, a sophist of *Chalcedon* who flourished in the 5th century B.C. He is introduced by *Plato* into his *Republic*.

Thread, a fine cord made by twisting the fibres of such substances as cotton, wool, silk, and flax. The slightly twisted yarn used for weaving are strictly called threads, but the term is more commonly applied to the stronger and more highly finished cords used for sowing, &c. The cotton or other material is first twisted into yarn, which is doubled upon itself and twisted in the opposite direction to the original twist. The product is then two-ply thread. To make a stronger thread, e.g., six-cord thread, a number of two-ply yarns are twisted by the winding machine again in the opposite direction to the previous twist.

Thread Cells, see *STINGING CELLS*.

Threadneedle Street is a busy thoroughfare, running from *Bishopsgate Street* to the Bank of England in the City of London. It received its name from the Merchant *Taylor's* Company.

Thread-worms, see *NEMATODES*.

Threats. It is a felony either (a) verbally to accuse or threaten to accuse another of any infamous crime (e.g. murder, rape), with a view to extort from the person so accused or threatened or from any other person

any property, money, or valuable security; or (b) to send a letter containing T. to accuse another person of crime with intent to extort something of value; and so gravely does the law regard this offence that a conviction may involve a sentence of penal servitude for life. The guilt or innocence of the recipient is only material in considering whether the intention of the prisoner was to extort money by his T., or merely to compound a felony (see *under* COMPOUNDING). Similarly it is a felony punishable with penal servitude for any term up to life to send a letter demanding with T. and *without* reasonable cause any money or property. Sending a letter con- T. to murder a person, or to destroy his house, or to maim his cattle, are all felonies punishable with ten years' penal servitude.

Three-Colour Process, see PRINTING.

Three Kings, Feast of, see TWELFTH DAY.

Three Rivers, or Trois Rivières:

1. The cap. of St. Maurice co., in Quebec, Canada, and lies at the confluence of the St. Lawrence and St. Maurice, 94 m. N.E. of Montreal. Lumber, cereals, and cattle, are shipped from its harbour, and furniture and boots and shoes are manufactured. The city is also the see of a Roman Catholic bishop. Pop. 13,691.
2. A tn. with mineral springs and light car factories, on the St. Joseph R., 128 m. by rail E. of Chicago, in Michigan, U.S.A. Pop. (1910) 5072.

Thresher, see FOX-SHARK.

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Throat, the front of the neck; or the upper part of the respiratory passages in the neck. See PHARYNX, LARYNX, QUINSY, SORE THROAT, etc.

Throckmorton (or Throgmorton),

Sir Nicholas (1515-71), an English politician and diplomatist, fought at the battle of Pinkie (1547), and was imprisoned for complicity in Wyatt's rebellion (1554). While on a mission to France he was again imprisoned, for siding with the Huguenots. He went on many missions (1561-67) to Scotland for Elizabeth, but was sent to the Tower (1569) for plotting with Norfolk on behalf of Mary Queen of Scots.

Thronthjem, see TRONDHEIM.

Thrush, a species of inflammation of the mouth due to a particular fungus known as *Oidium albicans* or *Candida albicans*, and characterised by white patches. It is frequent in feeble children, and is treated by washing the mouth with antiseptic solutions. Diseases, may also be affected by it.

Thrushes (*Turdidae*), a family of passerine birds of very extensive distribution and of omnivorous diet. The typical genus *Turdus* includes several British species, such as the blackbird, the ring ousel, redwing, and fieldfare, to which the name T. is not commonly applied. The song T. (*q.v.*), thrush, or mavis, is one of the best known British song-birds. The missel T. or holm T. (*T. viscivorus*) is a larger bird with a slightly forked tail. It sings before and during storms.

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he was assassinated at Athens soon after his return; according to others he died at Thasos, and his bones were carried to Athens. At all events, his death cannot be placed later than 401. The Peloponnesian War forms the subject of the history of T. Though he was engaged in collecting materials during the whole of the war, he does not appear to have reduced them into the form of a history until after his return from exile, since he alludes in many parts of it to the conclusion of the war (i. 13; v. 26). He did not, however, live to complete it: the eighth book ends abruptly in the middle of the year 411 B.C., seven years before the termination of the war. The object of the history of T. was to give such a faithful representation of the past as would serve as a guide for the future (i. 22). His observation of human character was profound, and his painstaking accuracy and careful attention to chronology are remarkable. His strict impartiality is another feature of his work. His style is marked by great strength and energy, but he is often obscure, particularly in the speeches, which Cicero found as difficult as we do. See Bury's *Ancient Greek Historians*, and Jebb's essay on the speeches of T. in *Hellenica*. The best English edition is that of Jowett (1881).

Thucydides, an Athenian statesman who led the aristocratic party in opposition to Pericles. He was ostracised in 444 B.C.

Thugs, roving bands of fanatical murderers and robbers who, prior to their suppression in 1830 by Lord William Bentinck, used to infest various parts of Central and Northern India. Thuggery, as their system was called, had a religious basis, the murdered persons and a certain part of their belongings being regarded by the T. as sacrifices to the goddess Kali.

Thuin, a com. of Belgium, in the prov. of Hainaut, on the Sambre, 8 m. S.W. of Charleroi. There are blast furnaces and stone quarries. Pop. 6300.

Thuja, see ARBOR VITAE.

Thulden, Theodor van (1607-76) a Flemish painter and etcher, born at Bois-le-Duc. He assisted Rubens in executing the Gallery of the Luxembourg in Paris. His larger works, such as 'The Martyrdom of St. Andrew' and 'St. Sebastian,' are in the style of Rubens, but his smaller pieces, on markets and fairs, are in the manner of Teniers. He was a fine etcher, and made copies of the works of Abat and Rubens.

Thule, the name generally given

by the ancients to the most northerly part of Europe known to them. According to Pliny, it was an island in the northern ocean, discovered by the navigator Pytheas, who reached it after six days' sail from the Orcades. The name T. appears to be merely a classic form of the Gothic *Tiel* or *Tiule*, 'remotest land.'

Thumbserew, an instrument of torture which was largely used by the Inquisition in Spain. It is constructed so as to cause the

Thun: 1. A lake of canton Bern, Switzerland, traversed by R. Aar, and discharging into the Rhine. Length, 11 m., greatest width, 1840 ft. 2.

A tn. of canton Bern, Switzerland, on R. Aar, 1 m. below its exit from above lake, 15 m. S.E. of Bern. A trade centre, and has slate and brick works. Pop. 7415.

Thunder, see LIGHTNING.

Thunderstorms, a series of electrical discharges (q.v.)

and thunder. Thunder is produced by the sudden expansion of the air along the track of the lightning. The instant the heating action of the electric spark ceases, the expanded air contracts violently, giving rise to a sudden clap or explosion. The rolling of thunder is due in great measure to repeated echoes. Heat T. are associated with sudden alterations of temperature, and predominate in summer and in hot climates. They most commonly occur in the early afternoon. Cyclonic T. are a common feature of our winter gales and are more dangerous than the summer storms. These winter storms occur at all hours and show no marked diurnal period. With regard to geographical distribution, T. are more abundant in hot than in temperate climates. See Scott's *Elem. Meteorology*, 1907; and Abercromby's *Weather*, 1888.

Thuret, Gustave Adolphe (1817-75), a French botanist, born in Paris. He published researches on the fecundation of the Fucaeae in 1853 and 1855, and in 1867 solved with Bornet the question of sexual reproduction in Floridæ. He established a botanic garden at Antibes on the Mediterranean. His *Etudes Phytologiques*, 1878, and the *Notes Algologiques*, 1876-80, are his chief works.

Thurgau, or Thurgovia, a canton of N.E. Switzerland, having Lake Constance and the Rhine to the N. and N.E. Area 381 sq. m. It is watered by the Thur, Sitter, and Murg. The surface is undulating and fertile. Embroidery, spinning, and weaving are the chief industries. Pop. 134,055.

Thurifer (Lat. *thus*, incense, *fero* I bear), that attendant or acolyte who bears the incense at solemn services.

Thurii, more rarely **Thurium** (*Terra Nuova*), a Greek city in Lucania, founded 443 B.C., near the site of the ancient Sybaris. It was built by the remains of the population of Sybaris, assisted by colonists from all parts of Greece. Among these colonists were the historian Herodotus and the orator Lysias. The new city rapidly attained great power and prosperity, and became one of the most important Greek towns in the S. of Italy.

Thuringia, a name applied to a region of Central Germany, including the minor states of Saxe-Weimar, Saxe-Coburg-Gotha, Saxe-Meiningen, Saxe-Altenburg, Schwarzburg-Rudolstadt, Schwarzburg-Sonderhausen, and two Reuss principalities. The Thuringian Forest is a mountain range of Central Germany, extending N.W. from the Frankenwald for 50 m. to the Werra, culminating in the Beerberg (3225 ft.), and the Schneekopf (3205 ft.).

Thurles, a par. and market tn. of Tipperary, Ireland, on the Suir, 34 m. E. of Limerick. There are turf bogs and coal mines near by. Pop. (1911) 4549.

Thurloe, John (1616-68), an English politician, was appointed secretary to the Council of State in 1652. He sat in Parliament (1654-56), and in Cromwell's second council (1657), and was appointed governor of the Charterhouse (1657), and chancellor of Glasgow University (1658). He strongly opposed the Restoration, and was tried on a charge of high treason, but acquitted.

Thurlow, Edward, first Baron (1732-1806), Lord Chancellor, distinguished himself at an early age at the bar, and took silk in 1762. Three years later he entered Parliament, and in 1770 was Solicitor-General, and a year later Attorney-General. In 1778 he became Lord Chancellor, and was raised to the peerage.

Thurman, Allen Granbery (1813-95), an American jurist and politician, born in Virginia. He was called to the bar in 1837 at Ohio, and by 1854 had risen to be chief justice. In 1869 he was elected to the United States Senate where he became the recognised Democratic leader, and was mainly responsible for the Thurman Bill, which became law in 1878.

Thurn and Taxis, Princes of, a succession of princes who ruled over an immense stretch of ground in Central Europe. The most famous of them, Count Matthias, commanded the Bohemian forces at the time of the dispute over the Bohemian succession

and later served Denmark and Sweden, being finally imprisoned and released by Wallenstein. The Princes of Thurn and Taxis claimed an hereditary right over the administration of postal affairs in Central Europe, they having established posts as early as 1460. The last vestige of these rights disappeared in 1868 with their purchase by the N. German Federation.

Thurn, Heinrich Matthias, Count von (1580-1640), was the leader of the Bohemian Protestant insurrection at the beginning of the Thirty Years' War (1618). He invaded Austria in 1619, but was forced to flee after the battle of the White Hill at Prague. He afterwards served in the Swedish army and took part in the battles of Breitenfeld (1631) and Lützen (1632). He surrendered to Wallenstein in 1633.

Thuret, François (1726-60), a French sailor, born at Nuits, and served first as a privateersman. He was in command of a squadron in the Seven Years' War, and did much damage along the E. coast of England and Scotland, but in 1760 he was defeated and killed by Hawke.

Thursdays Island, lies off the N. point of York Peninsula, Queensland, just E. of Capo York. It is one of the smallest of the Prince of Wales Is., and the chief occupation of its inhabitants (1600) is pearl fishing.

Thurso, a seaport of Caithness, Scotland, on Thurso Bay at the mouth of Thurso Water, 21 m. N.W. of Wick. It has a harbour safe for small vessels, but obstructed by a bar. It was formerly a trading centre with Scandinavia, and now exports Caithness flagstones. Pop. (1911) 3335.

Thurstan (d. 1140), Archbishop of York, born at Bayeux, elected Archbishop of York (1114), but refused to acknowledge the supremacy of the Archbishop of Canterbury or to accept consecration from him, and was finally consecrated by Pope Calixtus II. at Rheims (1119).

Thurston, Sir John Bates (1836-97), a British colonial governor, born in London. He went on a botanising expedition in 1864, and was wrecked on Samoa. Here he remained until 1886, when he went to Fiji, and was made consul in 1869. He brought about the transfer of the islands to Great Britain in 1874, and in 1880 was appointed governor of Fiji, to become governor and high commissioner of the Western Pacific in 1887.

Thuya, or **Thuja**, a genus of evergreen trees or shrubs (order Coniferae), with small scale-like leaves and moncelous flowers, the female catkins being followed by small cones. Many species are grown in gardens,

especially *T. occidentalis*, arbor vitae or white cedar, and its numerous varieties. The timber of *T. gigantea* is much valued in N. America.

Thwaites, George Heary Kendrick (1811-82), an English botanist and entomologist, born at Bristol. He made a special study of cryptogams, but in 1849, when made superintendent of the botanical gardens, Peradeniya, Ceylon, he did valuable work on flowering plants. Ho published *Enumeratio Plantarum Zeylanicæ*, 1859-64.

Thyatira, see AKHISAR.

Thyme, or *Thymus*, a genus of small prostrate aromatic plants, rose coloured, flowers. The *T. clamaedrys* and the mountain T. (*T. serpyllum*), of which the lemon-scented T. of gardens is a variety. The T. which is chiefly used for seasoning and flavouring is *T. vulgaris*, a native of Southern Europe.

Thymelaceæ, a small natural order of shrubby plants, with tough caustic inner bark. The only British genus is *Daphne*.

Thymus Gland, a temporary organ lodged partly in the anterior superior mediastinum, partly in the neck. It attains its full development at about the end of the second year of life, after which it gradually atrophies and at puberty has almost entirely disappeared. Its function is unknown.

Thyroid Gland (*θυρεος*, shield; *ειδος*, like), one of the so-called ductless glands consisting of two lateral lobes, conical in shape, connected at about their lower thirds by an isthmus which passes transversely across the trachea. A third lobe called the pyramid sometimes arises from the upper part of the isthmus or from one of the lobes, generally on the left side, and ascends to the level of the hyoid bone. Occasionally this lobe is found to be detached. Structurally, it consists of follicles lined with epithelium, producing a peculiar yellowish glue-like substance known as colloid. Its function is rather uncertain, but it is thought to be the production of some internal secretion which counteracts poisonous productions of the system. Enlargement of the gland, which may be due to hypertrophy of any of its constituent parts, is called goitre, and is occasionally associated with a disease known as exophthalmic goitre. Cretinism or myxedema results when the gland is absent. Preparations of the T. G. of animals are used medicinally.

Thyrus (Gk. *θύρος*), the wand carried by Dionysus and the Bacchantes when taking part in his orgiastic rites.

Thysanura, or Bristle Tails, an order of wingless insects, with long many-jointed feelers and small paired limbs on several of the abdominal segments. They occur under stones or in damp earth, and often in human dwellings, one especially favouring bakers' ovens. One of the best known is the 'silver fish' (*Lepisma saccharina*) often found among papers in drawers and cupboards.

Tian-Shan (*Thian-Shan*, celestial mountains), a mountain system of Central Asia, forming part of the boundary between Russian and Chinese Turkestan and extending N.E. from the Pamir to the western fringe of the Gobi desert. The main range, including the ranges of Peter the Great, Trans-Alai, Kokshal-tau, and Sary-yassy forms the border ridge of the High Plateau of E. Asia, to which they slope on the S.E. In this chain, with a general elevation of 15,000 to 20,000 ft., are the chief peaks, Kaufmann Peak (22,500 ft.) and Khan-Teagri (24,000 ft.), and the largest glaciers, and it is crossed by passes at an elevation of 10,000 to 14,000 ft. On the N.W. slope are a series of shorter fringing chains; running parallel to the main ridge. Among these are the Baisun-tau, Hissar, and Alai ranges; Bish-Illik, Chotkal, Talas, Ala-tau, and Alexandrovsk Range; the Trans-Ili, Kunghei, and Terskei Ala-taus, the Dzungarian Ala-tau, the Nura-tau, Kara-tau, Chu-ill Mts., Ueh-Kara, and the Chlugtz-tau. In this region are the depressions of Kokan or Fergana, Issyk-kul, Kulja, and Ebl-nor, and the gorges of the rivers Naryn, Ili, Zerafshan, and Tarim. The general elevation of these minor chains is 10,000 to 19,000 ft. Forest rises to about 9500 ft.

Tiara, the papal triple crown, or symbol of sovereign power, not sacred like the mitre. It is a high cap of gold cloth, encircled by three coronets and surmounted by a gold cross.

Tiarini, Alessandro (1577-1668), an Italian painter, born at Bologna. He worked for seven years under Passignano at Florence, with whom he acquired a great reputation. He then returned to Bologna and later adopted the style of the Carracci. His chief works are: 'Deposition from the Cross,' 'Miracle of St. Dominic,' and 'St. Peter's Repentance.'

Tibaldi, the name of two brother painters and architects: *Pellegrino Tibaldi* (1527-53), was born in Bologna, of humble parentage. He went to Rome and found his inspiration in the works of Michael Angelo. He painted the history of Ulysses for Cardinal Poggi's palace and also de-

signed the Poggi Chapel. He also designed the Palazzo della Sapienza at Palra, and the Duomo at Milan. *Domenico Tibaldi* (1541-83) executed the Palazzo Magnani, the Dogana, and the cathedral chapel at Bologna.

Tibbu, a nomad race of the eastern Sahara, mainly concentrated in the region of Tibesti or Tu, hence their name. They number about 100,000.

Tiber (Lat. *Tiberis*, It. *Tevere*), the chief riv. in Central Italy, on which stands the city of Rome. It rises in two streams issuing from the Apennines near Tifernum, on the eastern frontier of Tuscany, and flows S.W., dividing Etruria from Umbria. After flowing 110 m., it receives the Nera, and from its union with this river is navigable. Three miles above Rome it receives the Teverone, and within the walls of the city it is about 300 ft. wide and from 12 ft. to 18 ft. deep. The T. empties into the Sea by two arms, enclosing a dismal morass, once known as the Sacred Isle or Isle of Venus. Length 245 m.

Tiberius Claudius Nero (42 B.C.-37 A.D.), the second of the twelve Cæsars, was the stepson of Augustus, whom he succeeded on the Imperial throne. He was the son of T. Claudius Nero and Livia, afterwards the wife of Augustus. He was carefully educated and became well acquainted with Greek and Latin literature. At the age of twenty-two he was sent by Augustus to restore Tigranes to the throne of Armenia. In 13 B.C. he was consul with P. Quintilius Varus. Three years before this he had been given the charge of the northern wars, together with Drusus, and during three years from 12-9 Tiberius had conquered Pannonia. He remained in Germany and the surrounding provinces until the year 6 B.C., in which year he obtained the *tribunitia potestas* for five years, and retired with the emperor's permission to Rhodes. He returned to Rome at the end of seven years, and in 4 A.D. he was adopted by Augustus. In the same year he took command of the Roman armies in Northern Germany, and here he remained during the next seven years, though he paid frequent visits to the capital. On the death of Augustus, Tiberius hurried home, and the skilful management of Livia together with his own address secured the throne to him without opposition. Tiberius was suspicious in character, and he began his reign by putting to death Postumus Agrippa, the surviving grandson of Augustus. Then he proceeded step by step to make himself absolute. Even Tacitus, however, who had no love for the early Cæsars, admits that from 14-23 Tiberius governed with justice and

moderation, showing an especial solicitude for the interests of the provincials (*Annals*, Bks. I.-III.). Tacitus, however, regards this good government as no more than a veil of hypocrisy, and he ascribes the departure of Tiberius from Rome in 26 A.D. to a desire to give full vent to his sensual inclinations in private. Tiberius had long hated Rome, and in 26 A.D. he left it never to return. He first went to Campania on the pretext of dedicating temples there, but in the next year he moved to Caprea, an island off the Campanian coast. Meanwhile his minister Sejanus, whom alone he seems to have trusted, and in whose hands the real government of the state had long rested, was plotting to obtain for himself the imperial power. In 31 A.D. he was put to an ignominious death, to which many of his friends followed him. On March 16 Tiberius died at the villa of Lucullus at Misenum, having been smothered by the order of Macro, the prefect of the Prætorians. The character of Tiberius has been one of the most disputed points in history. Tacitus and Suetonius unite in painting it in the blackest colours, but there is much which tends to show that their history cannot be taken too literally. He is defended by Dean Merivale in *History of the Romans under the Empire*, and by Professor Bessley in *Caligula, Claudius, and Tiberius* (1878). See also Mommsen's *History of Rome* (vol. v.).

Tibesti, a mountainous dist. of the Sahara, in the region inhabited by the Tibbus. The camels are the most valued in E. Sahara, and the district also produces donkeys, goats, and sheep.

Tibet, or Thibet, a country in Central Asia, nominally a dependency of China. It is bounded by the Kwenlun Mts. on the N., separating it from Eastern Turkestan, by China proper on the E., by the Himalayas on the S., separating it from British India, Blintan, Nepal, etc., and by Kashmir on the W. The surface is an elevated table-land, the average height of which is 16,000 ft. above sea-level, the highest plateau in the world. The Northern half of T. is almost devoid of vegetation owing to the severity of the climate; there are numerous mountain ranges, and in the valleys are numbers of lakes, many of them salt, and also hot springs. To the S. of the Tangia Mts. the climate is less severe, it is therefore the most populous part of T. Here also lie the upper courses of the great rivers, the Brahmaputra, the Indus, Sutlej, Ganges, Mokong, Salwin, Kwang-ho, and Yangtze-kiang. To the N. of the Brahmaputra lie great mountain

ranges with peaks that are of such immense height that they top the Himalayan Mts. to the S. Of these the most important are the Nienchen-tang-la and the Hlungpo-Gangri ranges. Gold is found in T. and according to some explorers there is a field of wealth in Northern and Eastern T. that has been scarcely touched. Mining is only carried on in a few places, and though some gold is exported to China it is comparatively little. Iron pyrites are found and lapis-lazuli and mercury in small quantities, and salt and borax are found among the lakes. The climate varies considerably, though for the most part cold and dryness may be said to be the prevailing characteristics. It is influenced by the S.W. monsoon and is subject to a great deal of wind. In certain districts the rainfall is very high and in parts extremes of cold and heat are felt. Sheep and cattle are reared, also goats, pigs, and poultry; and horses, mules, and donkeys are used. There are innumerable species of wild animals, including the yak, leopard, deer, antelope, bear, wolf, etc., and rare kinds of pheasants and partridges are also found. Trade is carried on principally with China, Turkestan, Mongolia, India, and Indo-China. The chief imports are silk, carpets, gold lace, tea, porcelain, leather, cotton goods, horses, and sheep, and the chief exports are wool and woollen goods, salt, rugs, furs, drugs, borax, and some gold and silver. The people of T. are of Mongoloid origin as far as is known, and they speak Tibetan; it is allied to Burmese, and comprises an almost endless number of dialects. The religion of the country is Lamaism (*q.v.*). Polyandry is a custom of the people, all the brothers in a family having the same wife. The country is divided into five provinces, Amdo, Kham, U which includes Lhasa, Tsang, and Nari. Though nominally dependent on China the real rulers of T. have for many years been the Lamas, whose authority is vested in the Dalai Lama at Lhasa. There is a Chinese resident at Lhasa, who officially represents China and is known as the *Amban*, and other Chinese officials reside in the country; certain taxes are levied by China, and they keep a few military stations in the country. At Lhasa there is a national assembly, or *Tsong-du*, which settles all the really important affairs of state, and is responsible for the foreign policy of the country. From very early days T. was the object of explorers, but owing to its position their journeys were fraught with much difficulty,

and up to the time of the British expedition of 1904 no European had succeeded in penetrating to Lhasa.

Of the early history of T. little is known. In 639 Strong tsan gam-po founded Lba-ldan, which later became Lhasa, and also introduced Buddhism into the country. In 1026 Atisha, the Indian Buddhist, went to T. and was the first of the long line of lamas who have since ruled T. In 1253 all the eastern part of the country was conquered by Kuhlai Khan, and it was he who first placed the government in the hands of the lamas. It was not until 1720 that the country was finally brought under Chinese rule. India had always been anxious to open up trade with T. and between 1872 and 1886 three different missions were organised but were given up. In 1888 the Chinese invaded Sikkim and a military expedition was sent to drive them out, which resulted in a treaty (1890-93). The lamas not having been consulted in the matter they took offence, and revenged themselves by trying to bring about a treaty with Russia. Further inroads were made into Sikkim, and Lord Curzon, then viceroy of India, came to the conclusion that strong measures were necessary. Colonel F. E. Younghusband was sent with an escort to see if he could come to terms, but he was unable to do anything. It was then decided to send an armed expedition, and in Dec. 1903 Colonel F. E. Younghusband (afterwards Sir) with General Ronald Maedonald in command of the troops set out, and after some severe fighting they reached Lhasa on Aug. 3, 1904, and the Dalai Lama fled. Peace was concluded in September by a treaty which provided against further incursions into Sikkim and established British trade marts, and also prevented any foreign power receiving concessions in the country; the Tibetans also had to pay an indemnity; China signed an agreement to this in April 1906. A treaty with Russia was concluded in the following year, in which it was agreed that no concessions should be sought by either power and no expeditions dispatched without the consent of both countries for a term of three years. In 1908 the Dalai Lama was reinstated in Lhasa by Chinese authority, but an insurrection taking place Chinese troops were sent to quell it and came into collision with the Dalai Lama, and this resulted in his being deposed by China, and he fled to India hoping to obtain help from the British (1910). When later a revolution broke out in China, the

Tibetans took the opportunity to rise against the Chinese, and in Aug. 1912 a treaty was signed which agreed that the Chinese should leave the country and return to China by way of India. The Dalai Lama then returned. In July 1912 the Chinese government sent out another expedition with the object of reconquering T., but in consequence of a memorandum sent to China by the British Government, drawing attention to the Anglo-Chinese treaty of 1906, it was withdrawn. The area is about 463,200 sq. m. Pop. about 6,607,800.

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Tibullus, Albius (c. 54 B.C.-c. 18 B.C.), a Roman poet, was descended from an equestrian family, whose estate was at Pedum, between Tibur and Praeneste. In the year 28 B.C. he followed his patron, Messala, into Aquitania and thence into the East, but was taken ill at Coreyra and had to return. His poetry, addressed to two mistresses under the names of Delia and Nemesis, has little ardour, but is marked by its air of gentle tenderness and self-abnegation; on the other hand his bucolic elegies are some of the sweetest and best in the Latin language. Horace was warmly attached to him. There is a good selection of his poems by Postgate (1906), and an English translation by Cranston (1872).

Tibur, see TIVOLI.

Tic Douloureux, see NEURALGIA.

Tichborne Case, one of the most celebrated trials in the annals of the English criminal law. The prisoner, Thomas Castro, otherwise 'Bullocky Orton,' the big butcher of Wapping, was tried and convicted for perjury in putting forward in the civil courts a bogus claim to the Tichborne title and estates (1880). Not only did Orton in posing as Sir Roger Tichborne, son of Sir J. P. Doughty Tichborne, Bart., answer with astonishing skill every question put to him in the civil actions, but even the real Tichborne's mother at first 'identified' him as her missing son. The whole proceedings cost the Tichborne family some

£70,000, in legal expenses. Castro was sentenced on two counts to two cumulative terms of seven years' penal servitude each.

Ticino, or Tessin: 1. A canton of Switzerland, lying on the Italian slopes of the Alps. Area 1088 sq. m. It is for the most part mountainous, but in the S. merges into the Lombard plain. In the S. is the larger portion of the Lake of Lugano and part of Lake Maggiore. It is watered by the Ticino and its tributaries. The climate and products vary with altitude. Cereals, tobacco, fruit, chestnuts, vines, and silk are cultivated. It was taken by the Swiss from Italy in 1512 and joined the League in 1803. Pop. 158,556. 2. A riv. of Switzerland and Italy, which rises in the above canton near Nufenen Pass, flows through Lake Maggiore and between Piedmont and Lombardy, and joins the Po 3½ m. S.E. of Pavia. Length 150 m.

Tickell, Thomas (1686-1740), an English poet, was appointed professor of poetry at Oxford University in 1711. He wrote much minor verse, some of which appeared in *The Spectator*, and his translation of the *Iliad* appeared simultaneously (1715) with that of Pope, a proceeding which resulted in the historic quarrel between Pope and T.'s friend, Addison. His best work is *Kensington Garden* (1722). When Addison became Secretary of State he made T. an under-secretary.

Ticket-of-Leave, see PRISONS.

Ticknor, George (1791-1871), an American author, born in Boston. Having studied in various countries he became in 1817 Smith professor of French and Spanish languages and literatures, and professor of belles lettres at Harvard, but resigned his chair in 1835 to devote himself to the study of the history and criticism of Spanish literature, the result of which appeared in his *History of Spanish Literature* (3 vols. 1849). Amongst other works are: *Outline of the Principal Events in the Life of General Lafayette*, *Lecture on the Best Methods of Teaching the Living Languages*, and *Life of William Hickling Prescott*.

Ticks, or Ixodidae, a family of Acarina, with flat bodies protected by horny shields. During part of their existence they are blood-sucking parasites on animals and birds, for which they have developed a rostrum or beak composed of two barbed harpoons above and below a dart. Eggs are laid on rough herbage and hatch into a white six-legged larva, which climbs up the leg of a passing animal and in some species completes its life history on the coat, but in others returns to the grass for a period. T.

cause irritation and onæmia, but their chief danger to their hosts is in the introduction of parasitic protozoa, causing such diseases as Texas fever and redwater.

Ticonderoga, a vil. of New York, U.S.A., in Essex co., situated on the W. shore of Lake Champlain, 95 m. N. of Albany, with manufactures of paper and wood-pulp. Pop. (1910) 2475.

Ticunos, Indians found in the forests of Brazil and Peru around the confluence of the Javary and Marañon. They have dark skins and good physique, and adorn themselves with feathers, etc., but wear no clothes. They live by fishing and hunting. They are described as being a peaceful and harmless people.

Tideman, Philip (1657-1715), a Flemish painter, born at Nürnberg, and became a pupil and assistant of Laireesse of Amsterdam. He chose his subjects from ancient mythology, his chief pictures being 'Venus complaining to Jupiter of Juno,' and 'Juno and Æolus.'

Tides are regular disturbances of the fluids on the earth, produced by the action of the gravitational forces of the moon and sun. The earth having a diameter of about 8000 m., is subject to a stress due to the different degrees of pull exerted in the near and far side; this stress and its variations have not been determined empirically. Some evidence, but only extremely slight, of tidal action in the atmosphere is barometrically shown.

moon can be simply determined. The moon's mass is $\frac{1}{80}$ that of the earth, its distance from the earth's centre 60 times the earth's radius; the attraction at C, the earth's centre = $\frac{g}{80 \times 60^2}$; at A, the sublunor point, $\frac{g}{80 \times 59^2}$; at B, the antipode, $\frac{g}{80 \times 61^2}$. The difference between A and B, $\frac{g}{80 \times 59^2} - \frac{g}{80 \times 61^2} = \frac{g}{38350}$.

This difference produces a lifting effect, when overhead or under foot, represented by a loss of one pound in a body weighing 4000 tons. As a result the waters of the ocean should 'bulge out,' as shown in the figure. The lifting effect at B is understood if A, C, and B are considered unconnected; they would then fall at different speeds towards the moon and separate more and more; as they are connected, in reality there is a tension which allows a degree of separation. The maximum lifting-force of a distant attracting body varies inversely as the cube of its distance; if d be the distance of the moon, M its mass, r the radius of the earth: attraction at A = $\frac{M}{(d-r)^2}$; at C = $\frac{M}{d^2}$. The lifting force at A = $\frac{M}{d^2} \left[\frac{1}{(d-r)^2} - \frac{1}{d^2} \right] = \frac{M}{d^2} \left[\frac{2dr - r^2}{d^2} \right] = \frac{M}{d^2} \times \frac{2r}{d}$, when r is very small compared with d . This is the reason for the sun's smaller effect; the attracting force, varying as the inverse square of its distance, 23,500 r , is nearly 200 times that of the moon; but its tide-raising force, varying as the inverse cube, is only about $\frac{1}{2}$ as much, being $g/19600000$.

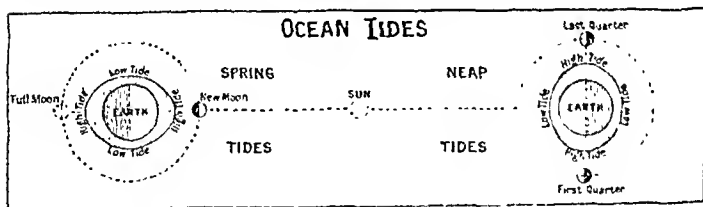


FIG. 1

The Oceanic waters are markedly disturbed, and the predominating influence of the moon is shown by the usual interval of 24 hr. 51 min. between similar phases being identical with the average interval between two successive passages of that body across the meridian.

Tide-raising forces.—The basis of tidal theory may be simply illustrated. The sun and moon are the only bodies concerned to any appreciable degree. Since gravitational attraction of a body varies directly as the mass and inversely as the distance, that of the

Fig. 1 shows clearly the combined effects for the statical problem with a uniformly ocean covered earth and no friction. At new and full moon both bodies are attracting in nearly the same line and give spring tides (left hand); at first and last quarter the attractions are at right angles, and high tide appears under the moon; low, under the sun. These are the neap tides. Spring tides, occurring at new and full moon, give a higher tide than the average and also a lower one than the average; neap tides of the quarters are lower

at high, higher at low tide, than the average. The principal tide here being that due to the moon, the sun raises the low at the expense of the high tides. When the moon is in perigee spring tides are higher, and if this occurs about Jan. 1, when the earth is nearest the sun, the highest tides are produced; in each case low tide is correspondingly reduced. The relative heights of spring and neap tides are about 7 : 4.

Rise and fall.—Since the earth with its waters is rotating, every place as it comes under the influence of external attraction has its waters gradually lifted to a maximum, then gradually dropped to a minimum. The *flowing* or *flood tide* is the former, the *ebb-tide* the latter movement.

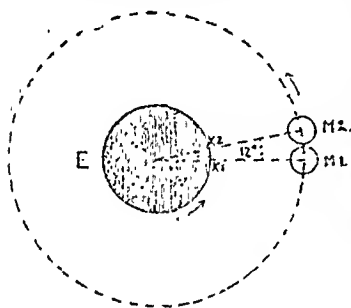


FIG. 2

Alternating high and low tides should occur, according to Fig. 2, twice each in twenty-four hours; actually the average period is 24 hr. 51 min., since during the rotation the moon travels forward in its orbit, so that a place carried by the earth's rotation from high tide position, completes a full rotation, but has to travel in addition another 12° or $\frac{1}{2}$ hr. before coming again under the moon.

Priming and lagging.—The tides *prime*, or arrive early, at the time of spring tide, the average interval being about 24 hr. 38 min.; at neap tides the interval averages 25 hr. 6 min., and the tides *lag*. These differences are due to the constriction of solar and lunar tides. At new and full moon, when these tides coincide, the crest would be under the moon; at quadrature the solar wave crest and trough combining symmetrically with the lunar trough and crest respectively, produces merely a difference in height, not a displacement. In other positions displacement will occur owing to the combination of the lunar and solar crests. This gives high tide, if the sun's influence is exerted

to the W. of that of the moon, about half an hour ahead for the angle 45° , three days after full or new moon. The half-hour is gained from diminished intervals for the three preceding days. When the solar crest occurs to the E. of the lunar within a quadrant, the combined crest is found further E. and is reached later by a similar interval, giving lag.

Diurnal inequality.—Twice a month the moon being at its farthest point N. (28°) of the celestial equator, the tidal wave crest is found in the N. hemisphere, its antipodal crest in the S. A sublunar place is carried round by the earth's rotation in a plane inclined at an angle to the diameter forming the crests, so that its record high tide is not at the antipodal crest but to one side of it, the second high tide being thus less than the first; this is known as the diurnal inequality.

The *theory of tides* has been worked out very completely by George Darwin, with very many interesting and important results. For example, Lord Kelvin concluded, from an analytical study of thirty-three years' observation, that the earth as a whole must be more rigid than steel, but perhaps not quite so rigid as glass. The friction due to tides involves a loss of energy obtained from the earth's energy of rotation, and tends to retard it, thus lengthening the day; there are counteracting forces, and in any case no difference has been actually noted; it could be only extremely slight, hardly as great as one-millionth of a second per year. Such a loss of gravitational speed would tend to accelerate the moon's orbital motion and cause that body to recede, thus lengthening the month. This forms the basis of Sir George Darwin's *tidal evolution* theory, which thus accounts for planets having receded from the parent body after separation.

Actual tides.—The configuration of land and water, and the varying depth of the latter, are the chief elements in completely upsetting calculations from theory. High tides occur at all intervals before and after the meridian noon in different places. For any port the mean interval is known as the *establishment of the port*; at New York it is 8 hr. 13 min., with a variation of 22 min. either way during the month; at London Bridge it is 1 hr. 58 min.; at Bristol, 7 hr.; Yarmouth, 9 hr.

Height of tides.—In the open ocean no accurate determinations have been made, but 2 to 3 ft. is the average height. Shallow seas, by diminishing the velocity increase the height, which may be exaggerated again by entry into converging channels or estuaries. A hundred feet, it is

said, has been recorded in the Bay of Fundy; at Bristol 50 ft. is attained, yet the E. coast of Ireland shows a range of only 2 ft. The effect of shallow water and projection tends to give rise to reflection and to set up tidal currents. Such currents may give rise to double tides as at Southampton, the falling tide of the channel driving through Splthead, the rising tide through the Solent, each giving high water. Such currents entering river mouths give rise to the bore, eger, or mascaret.

Uses.—Physiographically tides aid in the destruction of coast-line and help to carry debris to the sea; they prevent the formation of deltas, yet aid rivers in building their lower flood plains. Biologically they have immense influence, the sea-shore 'hot-tween tides' having its peculiar life. Commercially they are useful in carrying vessels further inland, and lessen the need for wind or steam power.

Absence of tide.—Though theoretically tides are produced in all bodies of water, they are often inappreciable; thus Lake Michigan has probably a tide of 2 in. Enclosed seas such as the Mediterranean and Baltic have a tide of anything up to 1 or 2 ft.

See Young, *General Astronomy*, 1896; Sir R. Ball, *Time and Tide*, 1889; Larousse, *1895*; Wheelor, *Tides and Waves* (Ency. Met.); and Darwin's papers in *Phil. Trans.*

Tideswell, a small tn. of Dorsetshire, England, 6½ m. E. of Buxton, and in the vicinity of Monsal Dale. Limekilns, quarries, and lead mines are in the vicinity. Pop. (1911) 1985.

Tidore, an island belonging to the Moluccas, Malay Archipelago, situated off the W. coast of Halmahera. It covers an area of 30 sq. m., its surface consisting of forest-clad volcanoes. Cotton and tobacco are cultivated and fishing is an industry. Cap. Tidore, on the E. coast. Pop. 8000.

Tieck, Johann Ludwig (1773-1853), a German writer of novels, criticism, and dramas, born at Berlin. He was the son of a rope-maker and made his début as a literary man by some sketches written after the French fashion of the day and published in the review *Straussfedern*. He was a great admirer of Shakespeare and a romantic writer, who showed his predilection for the bizarre and fantastic in a gloomy story in three volumes entitled *William Lovell* (1795). About this time he published his tale of *Peter Lebrecht* (1796), some poems (*Der Blonde Eckert*), and a play *Die Werkerle Welt*.

Tiedemann, Dietrich (1748-1803), a German philosopher, born at Bremer-vörde, near Bremen, was the author of *Versuch einer Erklärung des Ur-*

professor of ancient literature at the Carolinum in Cassel (1776) and at Marburg (1786-1803).

Tiedge, Christoph August (1752-1841), a German poet, born at Gardelegen in Prussia. His works are *den Mar Frauens*.

were edited by Dr. Falkenstein soon after his death.

Tiel, a tn. of Holland, in the prov. of Gelderland, on the Waal, 14 m. N.N.E. of Bois-le-duo, with a very considerable trade in grain. Pop. 11,358.

Tiele, Cornelis Petrus (1830-1902), a Dutch theologian and scholar, born at Leyden. He was professor of the history of religions from 1877-1901. His best known works are *On the Elements of the Science of Religion*, 1897-99; *Outlines of the History of Religion*, 1876.

Tientsin, a treaty port and city of China, in the prov. of Chi-li, at the junction of the Peiho with the Grand Canal, 76 m. S.E. of Peking. It is the emporium for Northern China, with an extensive trade. The exports consist chiefly of coal, skins, cotton, wools, groundnuts, beans, peas, and dates. Pop. 850,000.

Tierce: 1. Formerly a liquid measure equivalent to 42 gallons, or 35 imperial gallons. 2. In music, a major or minor third. 3. In gaming, a sequence of three cards of the same colour. 4. A thrust in fencing. 5. In heraldry, a term for the field when divided into three equal parts of different colours or metals.

Tierney, George (1761-1830), a statesman, entered Parliament in 1788. He was a persistent critic of Pitt, with whom he fought a duel (1798), and measures. He was in the navy under Lord Howe in 1806 was Board of Cor. of his party in opposition from 1817 to 1821.

Tierra del Fuego (Land of Fire), a group of islands separated from the southern extremity of S. America by the Strait of Magellan. It consists of several large islands, called Tierra del Fuego or King Charles' South Land, Navarin, Hoste, Clarence, Santa Inez, besides a number of much smaller size, the most important of which contains Cape Horn at the extreme S. The highest peak is Mt. Sarmiento.

(6900 ft.). Pop. 1000, savages of low type. T. was discovered by Magellan in 1520.

Tiers Etat, *see* STATES-GENERAL.

Tietjens, Teresa, *see* TITIENS, TERESA.

Tiffin, a city and co. seat of Seneca co., Ohio, U.S.A., on the Sandusky R. It is the seat of Heidelberg University (Reformed Church). Pop. (1910) 11,894.

Tiflis: 1. A gov. of Transcaucasia, Russia, bounded on the N.E. by the crest of the main Caucasus range and formerly part of the kingdom of Georgia. Area 15,776 sq. m. The surface is mountainous, the district containing the Caucasus in the N.E., the Mesques Mts. in the N.W., and the Anti-Caucasus in the S.W. It is watered by the Kura and its tributaries. Much of the land is forest, and there are considerable arid steppes, but in the valleys cereals, vines, and fruit are grown. Cattle, sheep, and goats are reared, and silkworms cultivated. The mineral wealth includes gold, silver, iron, copper, naphtha, and rock salt. Pop. 1,183,300. 2. The cap. of above gov., and of the lieutenantancy of the Caucasus, on R. Kura, 275 m. N.W. of Baku. It is a trading centre, and has numerous manufactures and hot sulphur springs. Pop. 196,935.

Tigellinus, Sphonius, son of a native of Agrigentum, the minister of Nero's worst passions, and of all his favourites the most obnoxious to the Roman people. On the accession of Otho, T. was compelled to put an end to his own life. Tacitus. *Annals*, xiv., xv.

Tiger (*Felis tigris*), a huge and powerful carnivore, peculiar to Asia, though absent from Ceylon, Afghanistan, Baluchistan, and Tibet. The Indian T. rarely exceeds 10 ft. in length, and the female averages about 8 ft. 6 in. Fine males weigh from 400 to 500 lb. Young animals, which are characterised by their canine teeth being hollow throughout, are handsomer than older ones, the tawny orange colour being richer and the stripes darker and closer together. Ts. are monogamous, though there is no reason to suppose that they pair for life. The period of gestation is fourteen or fifteen weeks, and from two to five cubs are born, though seldom more than two are reared. Ts. will eat carrion, but generally kill for themselves. Their food consists principally of deer, antelopes, and smaller animals, but occasionally powerful ones are attacked, and they sometimes kill the wild boar. Man-eaters are not, as is the case with lions, old and worn out, and many are in splendid coat when killed after a meal on human flesh.

The taste is generally acquired during a hunt from which the animal escapes after having mauled a man, but even man-eaters are known to hunt for other food.

Tiger Beetles (Cicindellidae), a family of beetles characterised by their large head and long legs, adapted for fast running in the pursuit of the small insects on which they feed.

Tiger Flower, *see* TIGRIDIA.

Tiger Lily, *see* LILY.

Tiglath-Pileser, the name of several ancient Assyrian kings (*see* ASSYRIA), of whom the third of that name is mentioned in the Bible. He ascended the throne in April 745 B.C. The revolution in the northern kingdom of Israel, which set Pekah on the throne of Samaria, appears to have coincided with a confederacy being formed against Assyria; the refusal of Ahaz to join it was the occasion of the determined assault made on the kingdom of Judah by Pekah and Rezin which led to the appeal to T. by Ahaz. In this campaign T. besieged Damascus, and, apparently masking it, he proceeded to the conquest of Gilead and Galilee, deporting the inhabitants.

Tigranes, or Dikran, the name of several kings of ancient Armenia, one of whom flourished as early as 550 B.C., and was a friend of Cyrus the Great, helping to overthrow the Median empire. The best known bearer of the name (c. 121-55 B.C.) is the son-in-law of Mithridates the Great. He was king of Armenia (c. 96-55 B.C.), and master of the Syrian monarchy from the Euphrates to the sea (83), founding the city of Tigranocerta. T. at first supported Mithridates against the Romans (76), but was defeated by Lucullus (69-68) and by Pompey (66).

Tigré, one of the three main divisions of Abyssinia, Africa, a district in the N.E., lying above the Takazze's delta. T. is bounded N. by Eritrea, S.W. by Amhara. Adua (cap.) and Ascum are its chief towns. Nominally subject to King Menelik II. of Shoa since 1889, T. has been partly attached in the N. to the Italian Eritrea. The inhabitants are a Semitic race.

Tigridia, or Tiger Flower, a genus of bulbous plants (order Iridaceae), natives of tropical America. They are grown in the cool greenhouse and also in warm borders where the bulbs must be protected in winter.

Tigris, a riv. of Asiatic Turkey, rising in several branches, the chief being the Schat, Dije, or Dikla, in the frontier mountains of Armenia and Kurdistan, near Kharput and Bitlis. The chief headwater flows E., passing S. of Lake Gelik, S.E. and S. to Diarbekir, and E. to Til, where it

receives the Bohtan Su or Chai, which rises about 20 m. S. of Van and flows W. to this point. The stream then flows S., entering the plains at Jezire, and then S.E. to Kurna, where it unites with the Euphrates to form the Schat-el-Arab. The chief tributaries are the Great and Little Zab and the Diala or Shirwan, all coming from the E. On the banks are Mosul, Tekrit, and Bagdad, and the ruins of Nineveh, Seleucia, Ctesiphon, the ancient Mesopotamia lying between it and the Euphrates. Length 1150 m., navigable by steamers to Bagdad.

Tikhvin, a tn. of Russia in the gov. of Novgorod, on Tikhvinka R., with distilleries and flour mills. Pop. 7000.

Til, or Teel, the seed of *Sesamum indicum* and *S. orientale*, cultivated in India and other warm countries. The seed is used for food, and the oil derived from it is employed in soap making and as an illuminant.

Tilburg, a tn. of N. Brabant prov., Holland, 14 m. from Breda. It is a great industrial centre, manufacturing cloth, woollens, soap, leather, etc. Pop. 52,754.

Tilbury Fort and Docks, a fortification in Essex, England, on the Thames opposite Gravesend, enclosed by a moat. Originally built by Henry VIII., it was enlarged by Charles II. The troops sent to crush the Spanish Armada were reviewed here (1588). The docks (c. 75 acres in area) were opened 1886, and now belong to the London and India Docks Company.

Tilden, Samuel Jones (1814-86), an American lawyer, born in New York, was admitted to the bar in 1837, became governor of New York. He endowed a free library in New York.

Tilia, a genus of tall trees (Tiliaceæ) with cymes of fragrant white or yellow flowers followed by nut-like fruits. See LIME or LINDEN.

Tiliaceæ, a natural order of trees and shrubs, many of which have a tough fibrous inner bark. Jute is derived from the genus *Corehorus*.

Till, see BOULDER CLAY.

Tillandsia, a large genus of mostly epiphytall plants (order Bromeliaceæ) natives of tropical America. A number are grown for their handsome foliage and showy bracts in the stovehouse. *T. usneoides*, a native of Jamaica, is able to retain rain in the expanded bases of its leaves, and this is sometimes used for drink by animals and travellers.

Tillemont, Sebastien Lenain de (1637-98), a French ecclesiastical historian, born at Paris. At the age of twenty-three he entered the episcopal seminary of Beauvais. In 1672,

he became subdeacon, then deacon, and in 1676 he received priest's orders. In 1681 he visited Flanders and Holland; and in 1682 undertook the charge of the parish of St. Lambert, but soon gave it up at the desire of his father. The principal works of T. are his *Histoire des Empereurs*, published in 6 vols., the first four during the author's life at intervals from 1690 to 1697, the remaining two after his death, in 1701 and 1738; and his *Mémoires pour servir à l'Histoire Ecclésiastique*, which extended to 16 vols., of which the first appeared in 1693, and the fifth was in the press at the time of his death. These five volumes came to a second edition in 1701-2, and were followed in 1702-11 by the remaining eleven.

Tillicoultry, a tn. of Scotland, Clackmannanshire, on the R. Devon, 4 m. N.E. of Alloa, with manufs. of shawls and shirtings. Coal is worked. Pop. (1911) 3105.

Tillotson, John (1630-94), Archbishop of Canterbury, born at Halifax, of a Calvinist family; educated at Cambridge. At the Restoration he conformed to the Church of England and became Bishop of Exeter (1666). In 1670 he was made Bishop of Canterbury, and in 1689 Dean of St. Paul's, and in 1691 Archbishop of Canterbury. He was a strong anti-Catholic, and published *Rule of Faith* (1666), four lectures on the Socinian controversy, and numerous sermons.

Tilly, Johann Tzerclas, Count von (1559-1632), born in Brabant and brought up by Jesuits. He first saw service in the Spanish army in the Netherlands. Later, he left the Spanish service for Austria, and in 1607 became general of the Catholic League.

Tilly, Albrecht von, a German general. He won the great battle of White Hill, near Prague, in 1620, and was also victorious at Wimpfen, Stadtlohn, Wieseloh, and Koolst. In 1630, T. was appointed commander-in-chief of the Imperial forces, and besieged and took Magdeburg, after a fierce struggle. Four months later, however, he was defeated at Breitenfeld, and shortly after, again on the banks of the Lech, where he was mortally wounded, and died at Ingolstadt the following day. See Klopp, *Tilly im 30-jährigen Kriege*, 1861; Wittlich, *Magdeburg, Gustav Adolf und Tilly*; Keym - Marcour, *Johan Tzerclas Graf v. Tilly*; Count Villormont, *Tilly, ou la Guerre de Trente Ans*, 1859.

Tilsit, a tn. of E. Prussia, on the Memel (Nemem), 60 m. N.E. of Königsberg. There are iron-foundries,

glass, cloth, and machinery manufs., and trade in grain, coal, cattle, etc. Here Napoleon I. concluded treaties with Russia and Prussia in July 1807. Pop. 39,010.

Timæus (c. 352 B.C.-c. 256 B.C.), a Greek historian, was the son of Andromachus, tyrant of Tauromenium in Sicily. He was banished from Sicily by Agathocles, and passed his exile at Athens, where he had lived fifty years at the time when he wrote the 34th book of his history. This, his greatest work, is a history of Sicily, from the earliest times to 264 B.C. See Introduction to Holden's ed. of Plutarch's *Life of Timoleon*, pp. xxiii.-xxxii.

Timæus of Locri, a Pythagorean philosopher contemporary with Plato. To him is usually ascribed the work, *περὶ τῆς τοῦ κόσμου ψυχῆς*. ('Concerning the Soul of the Universe'), written in the Doric dialect. It deals with the same subjects as Plato's dialogue, *Timæus*.

Timanthes, a celebrated Greek painter, flourished about the beginning of the 4th century B.C. He was a contemporary of Zouxis and Parrhasius. His masterpiece was the 'Sacrifice of Iphigonia.' He was a native of Sicily. See Tarbell's *History of Greek Art*.

Timaru, a seaport of S. Island, New Zealand, 95 m. S.W. of Christchurch. It manufactures flour and woollen goods. Pop. 7700.

Timbrel, or Tobret, a musical instrument of the Hebrews, like the modern tambourine. It was used by Miriam after the passage of the Red Sea, and by David when he danced before the Ark.

Timbucktoo (Timbuktu, Timbuctoo, or Tombouctou), a tn. of French Equatorial Africa, near the Sahara, 9 m. N. of the main stream of the Niger. Its position makes it a focus of caravan routes between Algeria, Morocco, and Tuab, and of traffic on the Niger, and it thus has considerable importance as a trade centre. It exports ostrich feathers, gum salt (from Senegal), and Morocco. Most of the houses are of straw and earth, but there are a few brick buildings, some mosques and schools, and a citadel and forts. In 1904 it combined with Zinder-Chad to form the military territory of the Niger. Pop. 5100.

Time, a certain fixed portion of duration. It may be chosen by reference to some regular occurrence of any natural phenomenon. Thus the day is determined by the apparent revolution of the sun and the year by the rotation of the earth on its axis. *Sidereal T.* is only employed in

astronomical work, the *sidereal day* being defined as the interval between two consecutive southings of a particular star. Thus the *sidereal day* is of constant length. *Apparent time* is taken from the revolution of the sun, the solar day being defined as the interval between two consecutive southings of the sun. This interval is by no means constant, due to the inclination of the ecliptic to the equator and the lack of uniformity in the velocity of the sun. The mean solar T. is the average of the apparent T., the maximum divergence being about sixteen minutes. T. can easily be determined by travellers by observing the transits of known stars across known vertical circles. At sea, the method usually employed is to note the altitude of a *Nautical Almanac* star, and the latitude, and from these, together with the T. indicated by the chronometer, the T. can be computed. Local T. varies with the longitude, it being one hour in advance or behind the true Greenwich T. for every 15° to the E. or W. of Greenwich respectively. Owing to the confusion from the various local Ts., a standard T. has been introduced, the Greenwich T. being taken as the standard.

Time Recorders are instruments for checking the time of arrival and departure of employees. Several systems are in use, e.g. signaturo, key, card, and various other methods. The essential feature of the machine in each case is a clockwork arrangement which works a printing mechanism which is set into operation by the employer. The 'Kosmold' recorder gives the best illustration of the signature system. In this recorder the clock drives a disc which is graduated into sixty divisions, each division representing a minute. This disc actuates one graduated for the hours, the hour disc being released one division for each revolution of the minute disc. The employee signs his name on a strip of paper which passes through the top of the recorder, he then presses a lever, thus bringing the paper into contact with the discs which print the time opposite the signature. When the lever is released, the mechanism moves the strip forward so as to allow room for the next signature, the roll being collected on a stock drum. In the key method, a key with number in raised figures is provided for each employee.

Times, The. This celebrated daily paper was founded in 1785 under the title of the *Daily Universal Register*, the name being changed to the T. in 1788. The early success of the T. was due to the personality and organising genius of John Walter. Briefly, his policy was

to eschew satire and gossip in favour of prompt and accurate news, fearless independence in political criticism, and the consistent support of the Anglican Church. He wrote nothing himself, but he inspired everything. He early secured the services of Peter Fraser, pre-eminently the writer of the great leaders (see JOURNALISM). On the death of John Walter in 1812 the T. passed into the hands of his second son, John. The editors of this period were successively Dr. Stoddart, its first professional editor, and Tom Barnes, a parliamentary reporter. On Stoddart's dismissal for the violent expression of his political antipathies, Southey was offered but declined the post. The T. of this period (1814) was far behind the *Morning Chronicle* as a 'commercial proposition,' but Walter by adopting Koenig's idea of printing by steam soon carried the T. ahead of all rivals (see JOURNALISM). As a consequence of this the historic turning-point in its career, its circulation and advertisement revenue increased enormously and enabled the proprietors to clinch its power as the voice of the nation all over the civilised world, on ascendancy which it retained unquestioned for the rest of the century and still retains to a certain extent. One of its most eminent contributors in the thirties was the celebrated Captain Sterling, whose powerful support of the Peel administration in 1835 earned that statesman's grotesque personal acknowledgments. It was this man's writing that earned for the paper the sobriquet of the 'Thunderer.' But the T. as England knew it in the eighties, was peculiarly the creation of its greatest editor, John Delane (see JOURNALISM). He, like Walter, left the impress of his discretion upon every article that appeared. The T. has always succeeded in securing as contributors some of the most distinguished men of its time, a fact which may explain why, notwithstanding the appearance in more recent years of the most formidable rivals, its articles have a weight and authority which they would probably lack if they appeared in any other paper. At one time or other, Beaconsfield, Lord Chancellor Brougham, Cardinal Newman (as 'Catholicus'), Lord Grey (as 'Senex'), Lord Macaulay, Sir William Harcourt (as 'Historicus'), Moore, Dean Stanley, Lord Sherbrooke, and Dr. Croly, contributed to the T. The T. in recent years encountered difficulties and went into liquidation. Lord Northcliffe, however, took the paper over and his characteristic enterprise soon showed itself in many ways. The price was reduced from 3d. to 2d.,

financial, colonial, commercial, and literary supplements were vastly improved, and its general tone of complacent old-world Toryism gave way to a more generous outlook.

Time - tables, see BRADSHAW, GEORGE.

Timgad, a decayed city of Algeria in the prov. of Constantine, 64 m. S.W. of the tn. of Constantine. It was founded by Trajan about 100 A.D.

Timoleon (c. 411-337 B.C.), a great Greek democrat, came of one of the noblest families of Corinth. His whole life was spent in a ceaseless struggle for liberty, and in his youth this led him to a sad excess—the murder of his own brother Timophanes, who was trying to make himself tyrant of Corinth. In 344 B.C. the Greek cities of Sicily sent to Corinth for aid against the Carthaginians, and T. was sent with a small force. He took possession of Syracuse, and set about the establishment of democratic government in all the Sicilian colonies. Meanwhile the Carthaginians landed at Lilybaeum (339). T. was not able to collect more than 12,000 men, but with these he marched against the Carthaginian troops and totally defeated them. A treaty was concluded in the next year, and T. continued his work. The flourishing state of Sicily at the time of his death shows how beneficial his influence was. See Holden's ed. of Plutarch's *Life of Timoleon* (1889) and introd. to this.

Timon the Misanthrope, an Athenian who lived in the time of the Peloponnesian War. On account of lugubrious sufferings, he is so called.

He is the central figure of Shakespeare's *Timon of Athens*.

Timor, or Timur, an island of the Malay Archipelago, largest and most easterly of the Lesser Sunda group. T. is separated from Ombay (N.W.) by Ombay Passage, and from Australia by the Timor Sea. Its area is about 17,700 sq. m. In 1859 a treaty divided the island between Portugal and Holland, the boundaries being finally arranged by a convention (1904), which was ratified (1908). Portuguese T. includes the N.E. of the island with the territory of Ambeno, and the island of Pulo Cambing, Dilly (Deli) being the capital and chief port. Dutch T. comprises most of the S.W., including Roti, Peman, Savu, Sumba, Alor, and E. Flores, with Kupang as the capital. The soil is dry and not very fertile, and the c
Mt. Atlas (12,000 ft.)
laki (10,000 ft.)
peaks. Among

coffee, wax, copra, sandalwood, and cattle; among the imports muskets, gunpowder, hardware, calico, etc. A noted breed of ponies is reared here. Pearls have been found off the S.W. coast. The staple article of food is sago. Pop. (Dutch), estimated at 310,000; (Portuguese), 300,000. See Van der Lith, *Nederlands-Indië*, 1893-94; Forbes, *A Naturalist's Wanderings in the Eastern Archipelago*, 1885; Zondervan, 'Timor en de Timoreezen,' in *Tydschr. Aardr. Gen.*, v., 1888; Dores, 'Apontamentos para um diccionario chorographico de Timor,' in *Bol. Soc. Geogr. Lisbon*, xix., 1901.

Timor-Laut, a collection of islands belonging to the Malay Archipelago, 265 m. E.N.E. of Timor, belonging to the Dutch. The chief islands are Yamdena, Selaru, and Larat. The chief industries are agriculture, cattle-raising, and trepang-fishing. Area of group 2060 sq. m. Pop. 24,858.

Timoteo da Urbino, or Della Vite (1469-1523), an Italian painter, born in Ferrara. He studied first under Francia, but later went to Rome and worked with Raphael. He spent some fifteen years at Urbino and executed an altar-piece and a 'Magdalen' for the cathedral of that city. He also painted the 'Noli me tangere' for the brotherhood of Sant' Angelo Minore, at Cagli.

Timotheus, an Athenian general of 4th century B.C. In 375 he defeated the Spartan fleet and took Coreyra, and in 373 was sent to relieve Coreyra then besieged by Sparta. He served the king of Persia for some time, but returned to Athens, and in 366-65 took Samos, and in 363-62 he besieged Amphipolis. He was ruined by an unjust charge preferred by Chares in 355.

Timotheus of Miletus (c. 440-357 B.C.), a Greek dithyrambic poet and musician. He added an eleventh string to the lyre and thus gained the displeasure of Athens and Sparta. His poems, on mythological and historical subjects, are daring in treatment and style. His fragments are printed in Bergk's *Poetalyrici graeci*.

Timothy, the young friend and fellow-labourer of St. Paul. He was a native of Lystra, his mother Eunice being a Jewess and his father a Greek. He accompanied St. Paul on the second missionary journey, and the lives of the two are henceforward closely connected. He was left as the apostle's representative at Ephesus, where he was the recipient of two epistles from him. Eusebius says that he met his death there in a popular riot.

Timothy, Epistles to, form with the Epistle to Titus the group known as the Pastoral Epistles, which consist

of elaborate instructions for the appointment of officers and the pastoral care of the Christian churches. They show many points of contact with one another and with the other Pauline epistles, but there are numerous departures from the latter both in diction and subject-matter. They are private letters of an official nature. One of the most disputed questions is their authorship. In spite, however, of many attempts to disprove the Pauline authorship, the balance of probability still rests decidedly with the traditional view. The only considerable objection is the difficulty of finding a time and place for these epistles in the recorded life of St. Paul, and it is now usual, therefore, to place them somewhere in the unrecorded portion. The second epistle is, therefore, placed during a second imprisonment of Paul, of which no record has remained. Many good reasons have been adduced in support of the hypothesis that St. Paul's activities did not end with the first imprisonment, but that much of his evangelical work took place after that date. For a full description of the pros and cons of this discussion, see articles in Hastings' *Dict. of the Bible*, and in the *Temple Dict. of the Bible* (1910).

Timothy Grass, see PHLEUM.

Timur Beg, or Tamerlane (1335-1405), a sultan of Samarkand, born at Kesh, of Mongol origin, a direct descendant of Genghis Khan. His father was the chief of the Turkish tribe of the Berlas. At the age of twelve, he was a soldier, and on the death of his father he began a life of conquest. He first assisted and then attacked Husain, Khan of Northern Khorasan and Jagatal, finally supplanting him in 1369. He made Samarkand his capital and rapidly made himself master of the whole of Turkestan and part of Siberia. He next attacked N.E. Persia. After a series of bloody and cruel conflicts, the whole of Persia, Georgia, Armenia, and the neighbouring states accepted him as suzerain. Timur then turned his arms towards the N. and overran Kiptshak. During the years from 1392-96 he was employed in consolidating these conquests. He then declared war against India, and in 1395 defeated the Indian army near Delhi. He later came into conflict with Europeans, when he attacked and took Smyrna, the property of the Knights of St. John. He died as he was marching to attack China at Otrá on the Jaxartes. His name Tamerlane is a European corruption of Timúr-lenk (Timur the Lame). He figures as the hero of Marlowe's great drama, *Tamurlaine*.

Tin (Sn, 119), one of the seven metals of the ancients, occurs as the oxide—tinstone or cassiterite (SnO_2)—and is found in Cornwall, Austria, and New South Wales. The metal prepared from the ore (see **CASSITERITE**) is white and lustrous (sp. gr. 7.3), and melts at 232°C . It is crystalline in structure and when bent emits a curious crackling sound called the 'cry of tin.' T. is not acted upon by the air and is therefore used for tinning iron (see **TINPLATE**). T. readily dissolves in hydrochloric acid with evolution of hydrogen and the formation of stannouschloride (SnCl_2). It is not acted upon by dilute sulphuric acid but dissolves in the concentrated acid. Stannic oxide is formed in the hydrated condition by the action of nitric acid on the metal, while aqua regia acting on the metal forms the tetrachloride (SnCl_4). T. forms two series of salts, the stannous, in which it is divalent, and the stannic salts, in which it is tetravalent. The stannic salts correspond with similar compounds of carbon and silicon, the

acid-forming oxide towards strong bases. The alloys of T. are of great value, the most important being gun-metal, solder, bronze, and bell-metal. See **PURTY POWDER**, etc.

Tinamou, any individual of the Tinamidæ, a family of game birds inhabiting the forests of tropical and Southern America. They resemble partridges in appearance, but have little or no tail. The wings are short, but they are able to fly with great speed.

Tinea, see **SKIN DISEASES**.

Tineal, see **BORÆ**.

Tinebrai, a tn. in the dept. of Orne, N.W. France, 13 m. N.N.W. of Domfront. It manufactures paper, tools, and hardware. T. was the scene of a battle between Ro- Normandy and his brother, H. of England, in 1106, after which Normandy was annexed to the crown. Pop. 3900.

Tincture, an alcoholic solution of the medicinal constituents of a drug. Some Ts. are prepared by simply dissolving the drug in spirit, some by maceration only, and others by a combination of maceration and percolation.

Tincture, in heraldry, the colour of the field of an escutcheon. See **HERALDRY**.

Tindal, Matthew (c. 1653-1733), an English deist, studied at Oxford, becoming fellow of All Souls (1678). After having joined the Church of Rome (1685), he returned to the

Church of England (1688), and later wrote controversial pamphlets, which all met with vehement opposition from the High Church party. See *Curl's Memoirs*, 1734; Hunt, *Religious Thought in England*, ii. 431.

Tindal, Nicholas (1687-1734), an English divine and historian, nephew of Matthew T. In 1724 he published *Antiquities, Sacred and Profane*, etc., after which he commenced and gave up a *History of Essex*. His best known work is his translation from the French of Rapin's *History of England*.

Tinder, an inflammable material, usually made of half-burned linen. Before the introduction of matches it was formerly one of the chief means of procuring fire. Partially decayed wood, especially that of willows and other similar trees, also affords T., and certain fungi furnish the German T., or amadou (q.v.).

Tinea, a term applied to certain skin diseases, caused by the action of parasitic fungi. See **RINGWORM**.

Tineidæ, a very large family of small moths, among the best known of which are the clothes' moths.

Tinfoil, see **FOIL**.

Tinned Meat, see **CANNING**.

Tinneveli, the chief town of the district of the same name, Madras, British India. It is now the headquarters of Protestant missions. It is famous for its temple to Siva. Pop. 40,000.

Tinnitus aurium (Lat. *tingere*, to tinkle), a ringing in the ears. It is caused by abnormal stimulation of the auditory nerve, and may be set up by the presence of water or other substances in the aural cavity, or by disturbances of the cerebral circulation due to unaccustomed or overstimulating food.

Tinos, see **TENOS**.

Tin-plate, consists of sheet wrought iron or mild steel superficially coated with tin. Sheets of iron are cleaned by warm dilute sulphuric acid, then scoured with sand and rubbed between hard rollers, they are annealed, immersed in acid, and scoured, and then dipped into tin melted under tallow. Excess of tin is squeezed out by passing between rollers immersed in melted fat. The tinned surface prevents the iron from rusting, and the plate is used chiefly for making cans to contain preserved fruit, meat, and fish, etc.

Tin-plates and Sheets. All iron and steel must first be scoured to remove impurities. Pickling agents formed a well-kept trade secret, but to-day it is accomplished by sulphuric acid, the

specific gravity of which is about 1.66. In order to prevent the oxidisation of the surface of the molten tin and by way of a flux, grease is placed on top of the tin-bath. In old days a specially prepared beef-tallow was employed, then sal-ammoniac (NH_4Cl) was used under the name of muriate of ammonia. But to-day zinc chloride and palm oil hold the field. There are three chief processes by which the tin can be deposited upon the iron or steel sheet: (1) by the blanching process, (2) by fat tinning, (3) by electro-deposition. In the first named alkali stannates are employed in a boiling solution, with the addition of granular tin. After washing and drying, the tinned article—usually small in size—is ready finished. Electro-tinning may be either performed by the feeble current set up by depositing the article to be tinned in an aluminium receptacle suspended in an ammoniacal solution, or else by a direct electrolytic process, using an alkaline solution of stannous chloride as the electrolyte and sheet of tin as the electrode. The most frequently employed process is, however, the fat-tinning, by which all the poorly tinned stuff for making 'canned goods' is provided. The amount of tin used for such goods is as low as 2 lb. of pure tin spread over about 63,000 square inches of the surface, whereas in the very best quality, such as is employed for dairy articles, the amount of metal may rise as high as 6 lb. for the same area. Sheets to be tinned by fat-tinning pass through several operations before they are completely finished. After being pickled and 'boshed,' they are close annealed at a bright cherry heat for about ten hours. After they have got quite cold, the sheets are cold rolled between two chilled rollers, which imparts a fine dense surface to the sheets. This process hardens them and necessitates a second annealing and a further pickling. Forty years ago the sheets were all hand-dipped, i.e. they were dropped first into the flux-bath and then were removed to the tin-pot covered with palm-oil. Then they were rapidly brushed and passed through a second similar pot at a slightly higher temperature. This unfortunately gave an uneven coating of metal, so that a great improvement was effected when the last pot contained rollers revolving in the palm-oil, which squeezed off any superfluous tin. This process is the one in use to-day. Plates larger than 21" by 30" are known as tinned sheets in the trade, and are made up as large as 36" by 72" or even larger if necessary. Tin plates are coated with a

mixture of lead and tin, containing up to 25 per cent. tin. They are largely used for motor-car construction, such as wings and under-shields. They are also suitable for making articles which are not intended for containing food stuffs, owing to the possible risk of lead poisoning. See Taylor, *Gauges at a Glance: Manufacture of Tin-plates*, 1. of Meeb. E., July 1906.

Tinsel, the name given to very thin glittering bits of metal used to ornament articles of dress, or the fabric in which such spangles are woven or attached.

Tinsley, William (1831-1902), a publisher, brought out Miss Brad-don's first novel, *Lady Audley's Secret* (1862), and the early books of many authors who afterwards became famous. In 1868 founded *Tinsley's Magazine*. His firm went bankrupt in 1878. He published in 1900 his *Random Recollections of an Old Publisher*.

Tintagel Head, a promontory of Cornwall, England, is 300 ft. high, 5 m. N.W. of Camelford. On it are the ruins of Tintagel Castle.

Tintern Abbey, ruins, in the co. of Monmouthshire, England, on the Wye, 4 m. N. of Chepstow. They date back to 1131, and were purchased in 1900 by the Government.

Tintoretto, Jacopo Robusti (1512-94), the chief painter of the later Venetian school, born at Venice. He at first studied under Titian, but later he worked on his own account. Among his numerous works are: 'St. George destroying the Dragon,' 'Christ washing the Feet of the Disciples' (both in the National Gallery), 'The Miracle of St. Mark,' 'The Crucifixion,' 'The Marriage at Cana,' 'The Paradiso' (in the Doge's Palace, the largest picture in existence, 84 ft. by 34 ft.), 'The Golden Calf,' 'The Last Judgment,' and a series of fifty-seven works in the Scuola di San Rocco. Tintoretto also painted portraits with considerable success, being especially skilful in depicting human flesh.

Tinworth, George (1843-1913), a modeller to the Doultons, Lambeth Pottery, born in Walworth. He has executed various works in stoneware and terra-cotta, some of which can be seen in the Guards' Chapel, York Minster, and Wells Cathedral, and amongst his panels an excellent example is contained in Truro Cathedral.

Tippecanoe, a riv. of Indiana, U.S.A., and a trib. of the Wabash R. Its length is 200 m. It was on its banks that General Harrison defeated the Indians in 1811.

Tipperah, a dist. of Bengal, India.

Area 2499 sq. m. It exports large quantities of rice. Cap. Comilla. Pop. 2,120,000.

Tipperary, an inland co. in the prov. of Munster, Ireland, bounded by Galway and King's co. in the N., Cork and Waterford to the S., Queen's co. and Kilkenny to the E., and Clare and Limerick to the W. To the N. and W. lies a mountainous region with Keeper Hill (2278 ft.), and in the S. are the Galtee Mts., with Galtymore (3015 ft.), the Knockmealdown Mts., and further F.

The Bog of . . . while in the . . .

Valo, one of the most fertile regions in all Ireland. The principal rivers are the Shannon in the N.W. with Little Brosna and Nenagh, the Suir and the Nore in the centre and S. Lough Derg is the only lake of any size. Agriculture is the chief industry, barley and oats are the main crops, potatoes and turnips also being grown; a considerable area is under pasture, and cattle are reared in large numbers. Dairy farming flourishes, and there are a number of butter factories. There are also flour and meal mills. Coal, copper, lead, and zinc are found, also slate and limestone, but mining is very little carried on. The county is divided into a N. and S. riding, and comprises twelve baronies; it returns four members to Parliament. There are interesting remains of castles and ecclesiastical buildings in various parts of the county, notably at Cashel where there is a round tower, at Ardfinnan, at Athassel (an Augustinian priory), at Holyross (Cistercian abbey), and at Felhard and Roscrea (abbeys). The county was one of those supposed to have been made by King John in 1210. It was granted to the earls of Ormondo in 1328, and was the last of the Irish palatine counties. The county town is Clonmel (10,167), other towns are Tipperary, Carrick-on-Suir, Nenagh, Thurles, and Cashel. The area is 1659 sq. m. Pop. (1911) 151,951, decreasing through emigration. 2. A market tn., co. Tipperary, Ireland, 23 m. S.E. of Limerick, at the foot of the Tipperary Hills. It is famous for its butter making, and there is also a condensed milk factory. Not far from the town is the Glen of Aherlow, and just outside the town is New Tipperary, the village built by Mr. William O'Brien in 1890, for the Smith-Barry tenants who had to give up their holdings on account of the boycott. Pop. (1911) 6200.

Tippermuir, or Tibbermore, a par. 5 m. W. of Perth, Scotland, famous for its battle in 1644, in which Montrose defeated the Covenanters.

Tippling Act. The Sale of Spirits

Act, 1750, prohibited any one from suing on a claim for spirits supplied unless the debt were to the amount of 20s. at least and was really a *bond fide* incurred at one time. The Tippling Act of 1862 repealed the above provision so far as it related to spirits sold or to be consumed elsewhere than on the premises where sold, and delivered at the purchaser's residence in quantities not less at any one time than a reputed quart.

Tippoo Sahib. *see* TIPU.

Tippoo Tib (Hamed ben Mohammed), a slave-trader in equatorial Africa, rendered aid to Cameron in 1874, and Stanley in 1876. He also took part in the Emin relief expedition in 1887, and became governor of the Stanley Falls district for the Congo State.

Tipstaff, an officer of the Supreme Court, whose duty it is to arrest and convey to prison persons committed by that court who are at the time actually present therein.

Tipton, a tn. of Staffordshire, 1½ m. N.E. of Dudley. It is engaged in coal mining and the manuf. of heavy iron ware. Pop. (1911) 31,763.

Tipu, or Tippoo Sahib (1749-99), son of Hyder Ali, succeeded his father as sultan of Mysore in 1782. He had previously distinguished himself in the Mahratta War, 1775-79, and in the first Mysore War had defeated Braithwaite, 1782. As sultan he concluded a treaty with the British in 1784, but in spite of this invaded (1789) the protected state of Travancore. War followed, and in 1792 he was obliged to resign half of his dominions. But nothing daunted he continued his intrigues, urging the French to stir up war with England, the result of which was the storming of his capital, Seringapatam, by the English, during which T. himself was killed.

Tipulidæ, *see* CRANE FLY.

Tiraboschi, Girolamo (1731-94), an Italian historian, born at Bergamo. He was a member of the order of Jesuits, and became professor of rhetoric in the University of Milan, 1755. Here he wrote, *Vetera Humiliarium Monumenta*, 1766, but being appointed in 1770 librarian to the Duke of Modena, he completed his masterpiece, *Storia della Letteratura Italiana*, 1772-82.

Tirah Campaign, a war which took place on the Indian frontier, 1897-98. It was undertaken by General Sir William Lockhart against the Afridis and Orakzais, who waged a perpetual guerrilla warfare, avoiding general engagements, and after losing many walled and fortified hamlets in the Tirah district opened negotiations for peace.

Tirana, a com. in the vilayet of Scutari, Albania, 54 m. S.E. of the city of Scutari. It is noted for its mosques. Pop. 12,500.

Tirano, a com. in the prov. of Sondrio, Lombardy, Italy, 15 m. E.N.E. of Sondrio, on the Adda. Pop. 6600.

Tiraspel, a tn. in the gov. of Kherson, Russia, on the Dniester, 65 m. N.W. of Odessa. It manufs. flour. Pop. 30,000.

Tiree, see TYREE.

Tireh, a tn. of Asia Minor, 25 m. S.E. of Smyrna. It manufs. cotton goods. Pop. 14,000.

Tiresias, a blind Theban seer of Greek mythology. The story goes that he was deprived of his sight by Athena whom he saw bathing, but was afterwards endowed by her, in pity, with wonderful gifts of prophecy. He was consulted by Oedipus and Creon, and Odysseus descended into Hades to ask his advice.

Tirhut, originally a dist. of Bengal. In 1875, however, it was divided into the two districts of Muzaffarpur and Darbhanga, new divisions being included in 1908. Area 12,600 sq. m. Pop. 9,700,000.

Tiridates, the name of a dynasty of Parthian or Armenian kings, five of whom are remembered in history. The two most important are Tiridates I. and II. *Tiridates I.* conquered his kingdom with the assistance of his brother, Vologesius. But Corbulo, from whom he had taken it, forced him to turn to Nero for assistance, whose suzerainty and paramount authority Tiridates was compelled to acknowledge. *Tiridates II.*, who was the son of Kosron, was educated at Rome, and won the friendship of the Romans by his military qualities. At the request of Licinius, Diocletian restored him to the throne of Armenia in 286. He was welcomed with enthusiasm by his people, anxious to be freed from the yoke of the Persians. Fortune, however, did not favour Tiridates long, for the Persians soon robbed him again of some of his richest provinces. In 296, however, the Romans replaced him on his throne. He embraced the Christian faith before his death in 314.

Tirlement, a tn. in Brabant, Belgium, 25 m. E. of Brussels. The chief manufs. are woollen goods and machinery. Pop. 19,100.

Tire, Marcus Tullius (c. 94 B.C.-5 A.D.), was the freedman of Cicero, to whom he acted as secretary. He was a man of highly cultivated intellect, and is said to have invented the art of shorthand as practised by the Romans. After the death of Cicero he lived in retirement on his farm in Puteoli.

Tirso de Molina (*alias* Gabriel Tellez), a famous Spanish dramatist, was educated at the University of Alcalá de Hénarès. When he had taken his degree he left for Madrid, in order to take up the life of a dramatist. Molina, or Tellez, as he is more generally known, was very prolific, and wrote no fewer than three hundred comedies, which, taking into consideration the length of his creative period, works out at the rate of two plays a month. Tellez ended his life as a member of a religious order. He became prior of the monastery of Soria, where he died at the age of sixty-eight. Among his best known plays are *Don Juan*, to which Molière was indebted.

Tirupati, a tn. of Madras, India, in the dist. of N. Arcot, 72 m. N.W. of Madras. It is celebrated as a place of pilgrimage, and has a wonderful pagoda. Pop. 15,000.

Tiruvannamalai, a tn. of British India, 50 m. S. of Vellore. It is an entrepôt of trade, and its annual festival in November is the largest in the district. Pop. 17,000.

Tiryns, an ancient tn. in Argolis, is said to have been founded by Proetus, who built the massive walls of the city with the help of the Cyclopes. Proetus was succeeded by Perseus, and it was here that Hercules was brought up. The remains of the city are some of the most interesting in all Greece. See Gardner, *New Chapters in Greek History*, ch. iv.

Tischbein, Johann Heinrich (1722-89), a German painter, the son of a haker, was born at Gotha. Through the help of Count Stadion, he was enabled to study in Paris for five years and afterwards in Italy. He became cabinet painter to the Landgrave of Cassel (1752), and director of the academy of Cassel. He excelled in historical and mythological subjects, his chief works being 'The Transfiguration,' 'Life of Cleopatra,' and 'Death of Alcestis.'

Tischbein, Johann Heinrich Wilhelm (1751-1829), a nephew of the above, was also a painter of some note. His principal paintings are 'Conradin of Suabia,' 'Ajax and Cassandra,' and 'Hector taking leave of Andromache.' He published a work on animals and another on Homer, illustrated with his own plates.

Tischendorf, Lobegott Friedrich Konstantin von (1815-74), a German biblical scholar, born at Lengenfeld in Saxony. He made a special study of N. T. criticism at the University of Leipzig, and in 1845 became professor there. He made frequent journeys, notably in 1844, 1853, and 1859, in search of the best and most ancient MSS. of the N. T., and dis-

covered the 4th-century Sinaitic Codex at the monastery on Mt. Sinai. His works include: editions of the Sinaitic Codex, 1862-63; *Editio VIII.* of the New Testament, 1864-72; an edition of the Septuagint; the *Monumenta Sacra Inedita*, 1846-71; and *Reise in den Orient*, 1846; *Aus dem Heiligen Lande*, 1862, which describe his journeys.

Tissaphernes, a Persian soldier and statesman, the son of Hydarnes. He was satrap of Lower Asia in 414 B.C., and during the Peloponnesian War espoused the cause of Sparta though without giving any assistance. His plans being thwarted by Cyrus, who helped the Spartans, he repaired to the king Artaxerxes II., warning him against his brother, and took part in the battle of Cunaxa. He harassed the retreat of the 10,000, after which he resumed his old position as general-in-chief and satrap of Lydia and Caria. He then stirred up war with Sparta, but was beaten by Agesilaus near Sardis in 395.

Tisserand, François Felix (1845-96), a French astronomer and author of *Traité de mécanique céleste*. In 1892 T. was appointed director of the Paris Observatory. His *Leçons sur la détermination des orbites* was published in 1899; his *Sur les déplacements stellaires du plan de l'orbite*

céleste is his most important work.

Tissot, James Joseph Jacques (1836-1902), a French painter, remembered for his illustrations to the Bible. T. passed some considerable portion of his life in England, and did illustrations for some London journals. He made his name in this country as an illustrator of the Bible and of minor religious works. See his *Sainte-Bible: Quatre cents compositions par J. J. Tissot*.

Tissot, Simon Andrew (1728-97), a Swiss physician, born at Graney, but ultimately went to Lausanne where he became famous as a physican. He wrote *L'Onanisme*, 1760; *Avis au peuple sur la santé*, 1761; *Traité de l'épilepsie*, 1772; *Traité des nerfs et de leurs maladies*, 1782; *L'Inoculation justifiée*, 1754.

Tissue, in biology, a structure made up of cells and fibres entering into the organisation of a plant or animal. *Connective tissues* are those which serve to support the specialised portion of any organ; they are classified as *adipose*, or fatty T., *areolar* T., *osseous*, or bony T., *cartilaginous* T., *elastic* T., *fibrous* T., *lymphoid* T., etc.

Tista, a river of India, flowing through Sikkim and Bengal into the Brahmaputra. It rises in Tibet. Length 200 m.

Tisza, Koloman (1830-1902), a Hungarian statesman, born at Gecszt. He was elected to the Diet in 1861, and became leader of the more Radical party in the house, and when owing to his influence a new party had been formed out of Deak's followers, the Sybaldovii Party, or Free Principles Party, he became primo minister. It was mainly owing to T. that Austria remained neutral during the Franco-German War, and Hungary owes to him, besides many reforms, a consolidated government.

Tit, or Titmouse, names given to members of the passerine family Paridae. Five species, all great insect-eaters, are common in Britain, and two occur in a few districts; one of these is the bearded T. or reed pheasant (*Panurus biarmicus*), which is found only in Norfolk and Yorkshire. The male is about 6 in. long, and has a thin tuft of black feathers on each side of the chin; the general colour is light red. The crested T. (*Parus cristatus*) occurs only in parts of Scotland, though it sometimes visits England. The blue T. (*P. caeruleus*) is the commonest of these birds; its prevailing colour is blue, with green above, and a black throat. The coal T. (*P. ater*) has a black head, with a white patch on the nape. The great T. (*P. major*) is about 6 in. long and is yellow on the back, breast, and sides, with grey wings and tail, and black head and throat. The marsh T. (*P. palustris*) resembles the coal T. except for the latter's white nape and white spots on the wings. The long-tailed T. (*Acredula caudata*) is about 5½ in. long, and has the black tail feathers prolonged and graduated.

Titan, the largest of Saturn's satellites, discovered by Huyghens, 1655. It revolves round its primary in about 15 days 22½ hours at a distance of 771,000 m. Its diameter is probably 3000 to 4000 m., its mass 1/10 that of Saturn. It appears as the star of the ninth magnitude.

Titanes, the sons and daughters of Uranus (Heaven) and Gaia (Earth). They were twelve in number, six sons and six daughters. It is said that Uranus, the first ruler of the world, threw his sons into Tartarus. Gaia, indignant at this, persuaded the Titans to rise against their father. The Titans then deposed Uranus, liberated their brothers who had been cast into Tartarus, and raised Cronus to the throne. It having been foretold to him by Gaia and Uranus, that he should be dethroned by one of his own children, he swallowed his children successively. Rhea, therefore, went to Crete, and gave birth to Zeus in the Ditean Cave. When Zeus had grown up he availed himself of

the assistance of Thetis, who gave to Cronus a potion which caused him to bring up the stone and the children he had swallowed. United with his brothers and sisters, Zeus now began the contest against Cronus and the ruling Titans. This contest lasted ten years, till at length Gaea promised victory to Zeus if he would deliver the Cyclopes and Hecatoncheires from Tartarus. Zeus accordingly slew Campe, who guarded the Cyclopes, and the latter furnished him with thunder and lightning. The Titans were then overcome, and hurled down into a cavity below Tartarus.

Titania, see **MAB, QUEEN**.

Titanic Disaster was caused by the huge White Star liner *Titanic* colliding with an iceberg on the night of April 14, 1912. In all, close on 1500 persons were drowned, among the more well known being Colonel J. J. Astor, Mr. Jacques Futrelle, the American novelist and dramatist, Mr. E. D. Millet, the artist, Mr. William T. Stead, and Mr. Harry Widener, millionaire book-collector. Out of 2201 passengers, only 711 were saved. The T., which was then the largest boat on record, was on its maiden voyage to New York, and shortly before midnight of the third day of the trip, when in lat. 41° 26' N., and long. 50° 14' W., struck an enormous iceberg a glancing blow stripping off her bilge practically from end to end. Such life-boats as were on board were lowered in a calm sea and wholly or partly filled with passengers, the majority being women. Less than three hours from the impact the liner sank. The 711 survivors were picked up some hours later by the *Carthage*, with whom the T. had got into wireless communication.

The Mersey Report of the Royal Commission appointed by the British Government finds that (1) the ship was travelling at an excessive speed; (2) the captain was not negligent, but extra look-outs for ice should have been kept; (3) the life-boat accommodation was altogether inadequate; in which respect, however, the T. complied with the regulations of the Board of Trade and the provisions of the Merchant Shipping Act for the safety of passenger steamers; and (4) another steamer saw the lights of the T. and could have pushed her way through the ice and rescued most of those left on board.

Titanium (Ti, 48.1), a metal of the tin group and occurs in nature as the oxide which exists in the minerals rutile, anatase, and brookite. The metal is white and lustrous (sp. gr. 3.5), and is obtained by the electro-

lysis of a solution of the oxide in calcium chloride. T. unites directly with nitrogen to form a nitride having a metallic lustre. Like silicon dioxide, T. dioxide is the anhydride of a weak acid, but it also exhibits feebly basic properties. In its halogen compounds T. is tetravalent and hexavalent.

Tithe. Ts. were 'the tenth part of the increase yearly arising from the profits of lands, stocks upon lands, and the industry of the parishioners, payable for the maintenance of the parish priest, by every one who has things titheable, if he cannot show a special exemption' (Thomas Wood's *Institute of the Laws of England*). Ts. having long ago become commuted for a rent charge, the law of T. is of little practical importance. Ts. were payable before the Christian era (see Gen. xiv. 20), but in the Christian Church Ts. were first given by the faithful as spontaneous offerings, at the urgent solicitations of the clergy (Clarke's *Hist. of Tithes*). Such voluntary offerings were given in kind, most giving wool, corn, or other agricultural or farm produce. Canon law (q.v.) later enjoined payment as a legal obligation in accordance with the divine law of the O.T. (see **TENDS**). Ts. were either *predial*, *personal*, or *mixed*; *predial* being the produce of the soil (e.g. corn, wood); *personal*, the produce of labour and industry; and *mixed*, the produce of animals, including eggs (Eagle, *On Tithes*). *Personal* Ts. rested on custom only, but every man had to pay the other kinds. Prior to the decrees of the Lateran Council (1215), it was a common practice to pay T. to monasteries, but the Council restricted tithe-payers to payment to the parsons of parishes (Clarke). Hence most Ts. belonged as of common right to the parish incumbents, though sometimes laymen could show a right to a portion of Ts., based upon a prior voluntary grant to some spiritual corporation. Again, rectorial Ts., after the dissolution of the monasteries, frequently found their way into lay hands (see **IMPROPRIATION**). The only lands exempt from Ts. were barren heath, waste forest or glebe, old monastic lands held prior to the dissolution exempt from Ts., crown lands or lands held by a spiritual corporation which has never been known to pay Ts., and lands in respect of which a *modus* or composition real was payable (Millard's *Tithe Rentcharge*). (A *modus* was an agreement between parson or ordinary and landowners and patron, whereby the landowners agreed to pay a perpetual sum in lieu of T.) The Tithe Commutation Act, 1836, and amend-

all the Ts. of rentcharge amount of the Ts. of each parish were to be commuted.

Tithing: 1. In Anglo-Saxon police arrangements, associations of ten men (in the N. of England called the *ten-mannetale*; elsewhere *frithborh* or *frankpledge*) who, dwelling near each other, were sureties or free pledges to the king for each other's good behaviour. The name and division of T. itself still remains in parts of the country. 2. Levying a tax on or to the amount of a tenth. See **TITHES**.

Tithonus (Τιθωνός), in Greek mythology, was the son of Laomedon and brother of Priam. He was beloved on account of his beauty by Eos, who besought Zeus to bestow upon him immortality. This was granted, but as Eos forgot to ask for perpetual youth he became a hideous old man. As he could not die Eos changed him into a grasshopper.

Titian, or **Tiziano Vecelli** (c. 1477-1576), the greatest painter of the Venetian school, born at Pieve, in Cadore, a mountainous district of the Venetian Alps. Having shown a taste for art, he was sent to Venice to learn painting, and first studied under Zuccati, a mosaicist, afterwards becoming the pupil of Bellini and Giorgione. He seems first to have been employed in the decoration of houses, but he also produced works on canvas, notably the allegorical picture 'Sacred and Profane Love,' 'Doge Marcello' (at the Vatican), and 'Christ and the Pharisee,' 'Tribute Money,' of the Dresden Gallery, spoken of by Vasari as something stupendous and miraculous. In 1516 he went to Ferrara, and executed amongst others the 'Bacchus and Ariadne,' now in the National Gallery. In 1533 he became acquainted with the Emperor Charles V., who sat to T. for his portrait, rewarding him by making him a Count Palatine and a Knight of the Golden Spur. Returning from Bologna to Venice (1537), he executed his magnificent 'Battle of Cadore,' which unfortunately perished by fire in 1577, but he was again with the emperor at Milan in 1541, and in 1545 accepted the pope's invitation to Rome, where he painted portraits as well as 'Danæ,' now in the Naples Museum. In 1548 he undertook a journey across the Alps to join Charles V. at Aursburg, and painted the well-known portraits of Philip of Spain. From this time he was chiefly occupied in working at Venice, until in 1576 he died of the plague. T.'s works are remarkable for their magnificent colouring and technical skill.

He painted religious pictures as well as mythological, poetical, and allegorical subjects, and as a portrait painter he occupies the first rank. Among his numerous works are: 'Holy Family and St. Catherine,' 'Noli me Tangere,' 'Venus and Adonis' (all of which are in the National Gallery), 'Jupiter and Antiope' (Louvre), 'Alphonso of Ferrara and Laura Dianti' (Louvre), the 'Pesaro altar-piece' (at Antwerp), 'The Three Ages,' 'Titian and his Mistress,' 'The Repose in Egypt,' 'Martyrdom of St. Lawrence,' 'St. Peter Martyr' (1530, destroyed by fire at Venice, 1567), 'Assumption of the Madonna,' and 'Entombment of Christ' (Louvre).

Titicaca, Lake, a wonderful mountain lake in the Andes, on the frontier between Bolivia and Peru, in S. America. It is 120 m. long, and lies 12,545 ft. above the sea. Its area is 3200 sq. m., and its maximum depth is about 700 ft. The water is fresh but unpleasant. Coal has recently been found in the vicinity. This lake is bound up with the origins of the Peruvian civilisation.

Titians (or **Tietjens**), **Theresa** (1834-77), a Hungarian singer, created a veritable sensation on her first appearance in London (1858), when she played Valentine in *Les Huguenots*, and henceforward made this country her home. Gifted with an inexpressibly fine soprano voice and uncommon dramatic force, she was supreme in oratorio no less than opera.

Tit-lark, see **PITR**.

Title Deeds, deeds that establish a person's right or title to lands. The possession of the T. D. relating to any particular piece of land is of the first importance, since no one can validly sell or mortgage the land who has not got the deeds, though he may well mortgage the equity of redemption.

Titles, the additions to a person's name, indicative of some honour, office, or dignity, e.g. emperor, prince, chancellor, primato, duke, mayor. Some T. are held *virtute officio*, as for instance 'king'; others like the T. of the five orders of nobility in Britain, are hereditary, and some, like that of knight, are conferred for life only.

Titmouse, see **TIT**.

Titration, a method in quantitative chemical analysis. The amount of a substance in a definite quantity of solution is determined by causing it to react with a solution of another reagent of known strength. This reagent is contained in a burette and run out into the other solution till reaction is complete as shown by change of colour of an indicator such as litmus, methyl orange, phenol-

phthalen, or by cessation of effervescence. The quantity used is noted and the weight of reagent contained is thus known. From the chemical equation and the atomic weights, the amount of the other salt can then be calculated.

Titular, that which exists in name or title only, as a T. king or T. bishop. A T. bishop in the Roman Catholic Church is one who derives title from an extinct see. In ecclesiastical law, generally a T. is an Incumbent (*q.v.*) who enjoys his benefice without performing the duties appertaining to it. In Scots law T.s. of lands are those laymen to whom tithes (*q.v.*) have been granted by the Crown.

Titus, a friend and companion of St. Paul, not named in the Acts. All we know of him is learned from the letters of the Apostle. He was left by the latter as Bishop of Crete, and there he received the epistle which bears his name. Eusebius says that he remained unmarried and finally died in old age.

Titus (T. Flavius Sabinus Vespasianus) (40-81 A.D.), a Roman general, son of Vespasian. Roman emperor (79-81 A.D.). He won distinction early as military tribune in Britain and Germany, and helped to crush a Jewish insurrection (67), besieging and storming Jerusalem (69-70). T. was associated with Vespasian in the government (71), and succeeded him (79), proving a wise and kind ruler. See Suetonius, *Titus*; Tacitus, *Hist.*; Josephus, *Hist. of the Jewish War*; Tillemont, *Hist. des Empereurs*; Jung, *Dissertation*, 1761; Rolland, *Vespasian et Titus*, 1830; Stange, *De Titi Vita*, 1870; Beulé, *Titus et sa Dynastie*, 1872.

Titusville, a city of Crawford co., Pennsylvania, U.S.A., 18 m. N. of Oil City. It is the centre of the oil interest, and has iron works and engine works. Pop. (1910) 8533.

Tityus (Τιτυός), a giant of Eubœa, son of Gæa, or of Zeus and Elara. For offering violence to Artemis (or in other accounts to Leto) he was killed by Zeus or Apollo and then cast into Tartarus, where two vultures perpetually devoured his liver as he lay outstretched on the ground. See *Odyssey*, xi.; Lucrælius, *De Rerum Natura*, iii.; Virgil, *Æn.* vi. 595.

Tiumen, or **Tyumen**, a tn. in the gov. of Tobolsk, Siberia, 125 m. S.W. of Tobolsk. It manufs. carpets and has tanneries. Pop. 27,000.

Tiverton, a municipal bor. of Devonshire, England, on the Exe, 13 m. N.N.E. of Exeter. The chief building of interest is the old church of St. Peter. Lace-making is the chief industry. Pop. (1911) 10,205.

Tivoli (ancient *Tibur*), an ancient

tn., 18 m. E.N.E. of Rome, on the Teverone (ancient *Anio*), in Italy. Before Rome was built the Latin city of Tibur flourished. In Horace's day it was the favorite summer resort of wealthy Romans, and ruins of Hadrian's and Mæcenæ's villas, besides mausolea, aqueducts, and a circular temple are still shown. Apart from classical remains the Renaissance garden of the Villa d'Este (begun in 1549) excites much interest. Pop. 12,000.

Tixtla, or **Tixtla de Guerrero**, a tn. in the state of Guerrero, Mexico, 4 m. N.E. of Chilpancingo. It was originally the capital. Pop. 6500.

Tizi-Ouzon, a com. of Algeria, 53 m. E.S.E. of Algiers. It produces large quantities of fruit, and was formerly a Roman station. Pop. 29,000.

Tlaxcala, an inland state of Mexico and its capital. The state, which has an area of 1595 sq. m., lies on the Mexican plateau, average height 7000 ft., rising in Malinche to 14,636 ft. In the days of the great Aztec empire, T. proved a New World Switzerland, and maintained a sturdy independence within her mountain fastnesses till, in 1519, she became the ally of the Spaniards under Cortes. The capital lies 18 m. N. of Puebla. Pop. 2812.

Tlemcen, a tn. in the dept. of Oran, Algeria, 85 m. S.W. of Oran. It has a number of interesting buildings, among them being synagogues, mosques, and a museum of antiquities. It exports ostrich feathers and cork, and manufs. cotton and woollen goods. Rashgun is its port. Pop. (com.) 40,000.

Tlepolemus (Τηλεπόλεμος), in Greek mythology, the son of Heracles by Astyoche or by Astydamia. He was king of Argos, but died after slaying his uncle, Lycymnius. T. then settled in Rhodes, founding Lindos, Talyssos, and Camirus, in accordance with an oracle. In the Trojan War he fought for the Greeks, but was slain by Sarpedon of Lycia. See *Iliad*, ii. 658; v. 627.

Toad, the name usually applied to members of the genus *Bufo* and of the family Bufonidae. They differ from frogs chiefly by the total absence of teeth, the entire tongue which is bifid behind in frogs, and in certain anatomical features, such as the shoulder girdle and the sacral vertebra. In British Ts. a large poison-secreting gland, called the Paratoid, occurs, but this is absent from the frogs. It appears to be necessary for the poison to come into contact with the blood through an abrasion or other means to be noxious. The two British Ts. are the natterjack (*Bufo calamita*) and the common T. (*Bufo vulgaris*), which

is generally distributed over Great Britain, though absent from Ireland. It has longer hind limbs than the other and is able to hop. Its eyes are more lateral and the irises reddish-copper colour. The females are usually larger than the males. The natterjack, which is local in England, cannot hop, as the hind limbs are too short, but it is able to run and is often called the running T. Its eyes are more prominent and the irises greenish-yellow. During the breeding season the males croak very loudly. The value of Ts. to the farmer and gardener cannot be exaggerated as they feed entirely on insects, millipedes, woodlice, slugs, and snails.

Toadflax, or *Linaria*, a genus of plants and sub-shrubs (order Scrophulariaceæ), with a spurred corolla. A number of species grow wild in Britain, but some of them are not the ivy-leaved widely distributed, which re- from seed and by means of its long rooting stems. The yellow T. (*L. vulgaris*) is a handsome and common hedgerow plant, with terminal racemes and large yellow flowers. Several species are grown in gardens.

Toadstool, a popular name for other fungi than the mushroom. See FUNGI.

Toast (from Lat. *tostum*, scorched), a piece of bread dried and browned on either side before the fire. But it is also used of the invocation to the guests after dinner to drink to the health of the host, distinguished guests, absent friends, the royal family, the bride and bridegroom, etc., or of a great institution, society, or cause. In the 18th century pretty women were popularly called Ts., because it was the custom to drink their healths.

Tobacco. The use of T. dates from remote antiquity among the natives of the American continent. It was smoked in pipes and as cigars, and the Aztecs used nostril tubes for inhaling the smoke. The date of the introduction of T. into Britain has been fixed as 1559, Hernandez de Toledo having imported Mexican plants to Spain. Sir John Hawkins in 1565 first introduced it into England and though Sir Walter Raleigh and Sir Francis Drake did much to popularise its use twenty years later, there is good evidence that T. was being extensively smoked about 1573. T. smoking met with vigorous opposition, in which King James I. joined, and smokers were cruelly persecuted, smoking being declared a capital offence in some countries, while in the canton of Berne, its prohibition was

included with the Ten Commandments. Its revival was largely due to its repute as a disinfectant and its employment as a remedy for various maladies. By

18th century, very heavy, often being encouraged to smoke. The use of snuff displaced the practice of smoking in the Georgian period, but it gradually returned to favour with the reduction of taxation on T. The cigarette habit began with the return of the soldiers from the Crimea. The present popularity of smoking in Britain may be inferred from the fact that in the year 1911-12, the total income in customs and excise duties from T. was nearly £17,500,000, including an excise duty of 3s. 6d. per pound on home-grown T. which realised £10,228. Though smoking by women is customary in some of the Eastern countries, it is looked upon with disfavour elsewhere. Smoking by children and the sale of T. to them is forbidden in many states, including Britain. The chief T.-growing districts are N.W. Cuba, the states of Kentucky, Carolina, Ohio, and Virginia, but T. culture is an important industry in Turkey, Mexico, and most parts of the British empire, as well as to an increasing extent in Europe. It was grown in Britain in considerable century, but

hibited under Charles II.'s the American industry. In 1799 T. growing was again permitted in Ireland, and by 1829 500 acres were under cultivation, chiefly in Wexford, but two years afterwards was again forbidden. The crop was revived in 1898, and in 1904 the cultivation of 100 acres was authorised with the rebate of 1s. per pound, afterwards reduced to 2d. Within a few years it was possible to say that the industry was commercially sound and experimental work has also been undertaken in England with satisfactory results. Major G. F. Whitmore, in Norfolk, has shown that the crop is suitable for poor sandy soils which are practically worthless for any other purpose, and it is suggested that the crop is essentially one for the small holder. Nicotine, the characteristic alkaloid of T., and of high value as an

ing extract to be used for purely agricultural or horticultural purposes. (See Board of Agriculture Journal,

March 1913.) T. seedlings are planted out in May. The plants are topped and buds and shoots removed so that each bears about a dozen large leaves. These are harvested in September, and are dried in specially constructed barns in a temperature of about 75°. Afterwards they are sweated in covered heaps from six to eight weeks and are then fermented and dried. T. was formerly much adulterated with a large variety of substances, but the supervision is now so strict that it is practically impossible.

Tobacco poisoning is due to long-continued over-indulgence, and affects not only the heart and nervous system, but also the digestion. The best treatment is a general tonic, and an entire abstinence from T. for some weeks, when the symptoms will usually all disappear. Excessive smoking almost invariably undermines the constitution sooner or later.

The analysis of T. shows its ingredients to be: (1) A tobacco camphor called nicotianin, which crystallises and is solid at the ordinary temperature of the air; (2) nicotine, an alkaloid which, like conia, does not exist in T. in a solid form, having

The empyreumatic oil of T. appears to be formed during the destructive combustion, and does not exist naturally in the leaf, but is probably formed at the expense of the nicotine. It does not therefore exist in the infusion of T., the mode of action of which differs in several respects from the other forms in which it is employed. The products of T. when burnt, as in smoking, are carbonate of ammonia, nicotianin, empyreumatic oil, soot, and some gases.

Tobogganing (from an Indian word, *tobaakan*, meaning sledge), the practice of sliding down natural or artificial slopes of snow or ice on a sled having a curved-up front, and usually furnished with iron or steel runners. The American clipper-sled is about 13 in. wide and is fitted with round steel runners; the rider lies flat upon it, face downwards, and steers it with his toe. Two such sleds fastened together form a bob-sleigh or 'double-runner'; it is usually steered by turning the front runners by means of a wheel or ropes. The course from Klosters to Davos is nearly 2 m. long and has a drop of 800 ft.; on it are contested the International and Symond's Cup races.

Tobago, an island of the British W. Indies, 22 m. N.E. of Trinidad. The chief products are sugar, cotton, tobacco, cocoa, and rubber. It was discovered in 1498 and became the

property of Britain in 1763. Chief town, Scarborough. Area 114 sq. m. Pop. 20,000.

Tobas, The, a tribe of S. American aborigines who dwell between the Vermejo and Pilcomayo rivers. They are remarkable for their well-developed chests, their short limbs, and their European aspect. They belong to the Guaranian stock, and are much more savage than the Chiquitos.

Tobermory, a vil. on Tobermory Bay in N.E. Mull, Argyllshire, Scotland. Steamers ply regularly to the Clyde and to Oban, Skye, and Lewis. Pop. (1911) 997.

Tobin, John (1770-1804), an English dramatist, was a solicitor by day and a playwright by night. For fifteen years he persevered in writing comedies like *The School for Authors* and romantic dramas. Finally he offered *The Honey Moon*, a somewhat lifeless imitation of a Shakespearean play, to the Drury Lane management. Its performance was a huge success.

Tobit, Book of, one of the books of the Apocrypha, which, however, was included in the Alexandrian canon of the O.T. It is a Haggadic romance based on an old tradition, embodying in historical form a series of moral and religious lessons. Its date is given by Ewald as about 350 B.C., but Hitzig places it in the reign of Trajan.

Tobol, a trib. (425 m. long) of the Russian Irtysh, which it joins near Tobolsk. It rises in the S. Urals.

Tobolsk, a gov. and its cap. in Western Siberia: 1. The gov. which has an area of 535,739 sq. m., stretches from Semipalatinsk in the S. to the Arctic Ocean in the N. It is separated from European Russia by the Northern Urals, but otherwise is lowland. It is drained by the ramifications of the Ob (1300 m.) and its tributaries, the Irtysh and Tobol, etc. The climate is bleak and inhospitable. Far away in the N. stretch the barren, rolling 'tundras,' whilst in contrast with the fertile Tobol and Ishim steppe are the districts of Tura, Tara, and Tobolsk, where the treacherous *urmans* (quagmires) are interspersed among pathless forests (*taiga*). The cultivation of cereals is of the first importance, but cattle-breeding is also carried on. Pop. (1911) 1,842,400. 2. The tn. is a well-built city on the Irtysh, near its junction with the Tobol, 305 m. E.N.E. of Ekaterinburg. It was once the capital of W. Siberia. Pop. (1910) 20,292 (decreasing).

Toboso, a tn. in La Mancha, Spain, 60 m. S.E. of Toledo; famous in *Don Quixote*.

Tobruk, or Morsa-Tobruk, a port in

the prov. of Borea, Tripoli, 220 m. E. of Benghazi. It has an excellent harbour.

Tocantins, a riv. of Brazil, rising in the state of Goyaz and flowing N. into the Atlantic Ocean through the Rio Para. Its largest trib. is the Araguaya. Its course, which is much interrupted by rapids, is only navigable in some parts. Length 1500 m.

Toccata, in music, an instrumental composition. It is intended to exhibit brilliance of touch and execution, as the name, from Italian *toccare* to touch, indicates. A succession of notes of equal length give it a flowing movement, the whole having 'the air of a showy improvisation.'

Tocque, Louis le (1696-1772), a French painter, born at Paris. He became a member of the French Academy in 1734, and subsequently worked at St. Petersburg and Copenhagen, but he returned to Paris ere his death. The Louvre has some of his best pictures, while others are in the museums of Amiens and Nantes.

Tocqueville, Charles Alexis Henri Maurice Clérel de (1805-59), a French historian, accompanied Gustave de Beaumont to America to study prisons in 1831, and took the opportunity to collect materials for his *De la Démocratie en Amérique* (1835), a work of peculiar interest as the first reasoned and more or less unbiassed exposition of popular government in that country. An orthodox Liberal in politics, he was elected vice-president of the Assembly in 1849, was dismissed when Louis Napoleon became emperor, and met with an enthusiastic reception from John Stuart Mill and other great Whigs, when he visited England. He published *Ancien Régime et la Révolution*, 1856.

Tod, James (1782-1835), an English lieutenant-colonel and author, was appointed political agent in 1817 for the states of Western Rajputana, India, and took every advantage of the facilities his position gave him to collect information about the history, geography, and antiquities of that country, the result of his research being the *Annals of Rajasthan* (1829-32).

Todas, The, a pastoral tribe dwelling in isolated hamlets ('mand') on the slopes of the Nilgiri Hills, India, in what is a kind of 'tropical Switzerland.'

Todd, Henry John (1763-1845), an English author, became archdeacon of Cleveland in 1832. He wrote lives of Brian Walton, Bishop of Chester, (1821), and of Cranmer (1831), besides an *Authentic Account of our Authorised*

Version of the Bible (1834), and some theological treatises.

Toddy, a word used for the drink of hot whisky and sugar flavoured with lemon. It also applies to the juice of palms from which arrack is distilled.

Todea, a genus of evergreen ferns with fine or coarsely divided dark green fronds, some of which are semi-transparent. *T. barbara* is able to survive a dry atmosphere.

Todhunter, Isaac (1820-84), an English mathematician; graduate of London and Cambridge. At St. John's College he was a scholar, fellow, and lecturer in turn, heading the degree list as senior wrangler, and gaining the mathematical blue ribbon, Smith's Prize. He was a member of the council of the Royal Society. His text-books on algebra, trigonometry, and calculus, are well known in the schools.

Todi, a tn. in the prov. of Perugia, Italy, 24 m. S. of Perugia. There are remains from the time of the Romans and Etruscans, and a Renaissance church, Santa Maria della Consolazione. Pop. 16,600.

Tödi, a height of the Swiss Alps situated on the borders of the cantons of Glarus and Grisons. Height 11,887 ft.

Todi, Jacopone da, see JACOPONE DA TODI.

Todleben, Franz Eduard Ivanovich, Count (1818-84), Russian general and engineer, born at Mittau in Courland. He entered the Russian army as an engineer in 1836; served against Schamyl in the Caucasus (1848); in the Crimean War (1853) and in the Russo-Turkish War (1877-78). He constructed the Bosphorus bridge at Constantinople (1855). War he succeeded in the capture of Sebastopol, 1864-72; also Brialmont's Life in French, 1884.

Todmerden, a municipal bor. in the W. Riding of Yorkshire, England, 19 m. N.N.E. of Manchester. It has cottonweaving and spinning factories, foundries, and machine shops. Pop. (1911) 25,455.

Tofana, see AQUA TOFANA.

Toga, the principal outer garment of the ancient Romans, made of woollen material, usually white. It was a large semicircular piece of cloth, the straight side 4 or 5 yds. long, the width about 2 yds. It was worn with half the straight side hanging over the left shoulder in front, the other half brought round under the right and over the left shoulder. The 'toga pretexta,' worn by children, magistrates, and priests, had a purple border. At the age of seventeen the youth assumed the 'toga virilis.' The 'toga plecta' (em-

breidered) was worn by generals in their triumph. The emperors wore a purple toga. Mourners and persons impeached wore a 'toga pulla' of a dark colour, while those seeking office wore a bright one, hence name 'candidati.' The garment was not allowed to be worn by foreigners or slaves.

Toggenburg, the upper valley of the R. Thur, canton of St. Gall, Switzerland. It extends for about 30 m., and is enclosed on the N.E. by the chain of the Säntis (8216 ft.), and on the S.W. by the Kurfürsten (7576 ft.). The chief villages are Lichtensteig, Kirchberg, and Wattvill.

Togo, Count Heihachiro (b. 1846), a Japanese admiral and member of the Supreme Military and Naval Council, born in Kagoshima. From 1871-78 he studied in England at the Thames Naval College, Greenwich, and on the Worcester. He had already entered the Japanese navy and seen some service. He was made admiral in 1904, and acted during the Russo-Japanese war as commander-in-chief of the Combined Fleet. His exploits during this war were numerous, the chief being the bombardment of Port Arthur. He was present at the coronation of George V.

Togoland, has been a German colony since 1884. It is on the Gulf of Guinea, W. Africa, and is bounded on the N. by Upper Senegal and Niger (French), on the E. by Dahomey, on the S. by the Atlantic, and westward by the British Gold Coast territory. A chain of highlands runs from S.W. to N.E., the highest point being Mt. Atiakuse (3248 ft.). Togo lagoon receives the rivers Sio and Haho, and other streams are the Oti, Volta, and Mono. The climate is unhealthy, and only 363 Europeans live here (1910). Palm kernels, malzo, rubber, palm-oil, and cotton are exported, and cocoa, tapioca, and bananas, etc., are cultivated on fertile tracts which lie between arid rolling upland due woods and caoutch.

The capital, Lomé, is connected by rail with the coast. Palm-oil, and since 1911 with Atakpa.

occupations of the coloured peoples, who number about 1,500,000.

Tokat (ancient *Dazimon*), the chief town of Tokat sanjak, vilayet of Sivas, Asia Minor, 52 m. N.N.W. of Sivas. It manufactures copper-ware and leather. Pop. 30,000.

Tokay, or Tokaj, a town of Zemplén co., Hungary, at the confluence of the Bodrog and the Theiss, 148 m. E.N.E. of Budapest. It is famous for its wines. The vine grows on a plateau among the Hegyalja Mts. The average

annual production is 5,000,000 gallons, which is nearly all bought up within the country. Pop. 5100.

Tökölyi, Imre, Count (1656-1705), a Hungarian patriot, born at the castle of Késmárk (Zips). He was leader of the insurrection of 1678 against Leopold I., and captured many towns. The Porte declared him Prince of Hungary under Turkish suzerainty in 1682, and in the following year T. joined Kara Mustapha in invading Hungary, but was defeated outside Vienna and taken prisoner (1685) by the Turks for making overtures of peace independently. In 1690 with Turkish aid he won the battle of Zernest, and was declared Prince of Transylvania. After the peace of Karlowitz, the sultan created him Prince of Widdin.

Token (coinage), generally defined to mean money current by suffrance and not by authority. In the reign of Elizabeth coins called Ts. were struck by the corporations of Bristol, Oxford, and Worcester, and at a later period, even by private persons. In 1797 5s. Ts. were issued by the Bank of England, and in 1811 3s. and 1s. 6d. Ts., which continued in circulation till 1816. At the present day there is only in England a single or gold standard of money, and though silver and bronze (copper) coins are legal tender (see TENDER) up to a certain amount, they are really subsidiary or T. coins and may be compared to banknotes in that their intrinsic value is less than their nominal value.

Tokyo, or Tokai ('Eastern Capital'), the cap. of Japan, situated on the S.E. side of the island of Honshu in the Bay of Tokyo, on the delta of the Sumida R. Until 1868 it was known as Jedo, Jeddo, or Yedo ('Estuary Gate'), and received its present name when the Mikado removed his court thither from Kyôto. The magnificent palace in Japanese-European style, stands in the park Fukiage, not far from the ancient castle. To the E. of the palace lies the commercial and industrial part of the city, while the northern division is mainly educational, containing the Imperial University, which had 5098 students and 363 professors in 1910-11, the Law School, First Higher Middle School, etc. The port of entry, Yokohama, is 17 m. distant. T. has suffered frequently from fire, so many of the houses being built of wood, as well as from storms, earthquakes, and epidemics. The government buildings had to be rebuilt after the fire of 1891. The town was open to the residence of foreigners in 1869. Pop. 2,186,079.

Toland, John (1670-1722), an Irish man of letters, published in 1696 a

work entitled *Christianity not Mysterious*, which occasioned a controversy between the deists and the orthodox, and was in the following year, by order of the House of Commons, burnt by the common hangman. In 1701 he visited Hanover and Berlin, and four years later published a valuable *Account* of these courts, in which he gave interesting pen-portraits of the royalties. He wrote a life of Milton.

Toledo: 1. A prov. of the Tagus valley, Central Spain, 5920 sq. m. in area, formed (1833) from part of New Castile. It is bounded N. by Avila and Madrid, E. by Cuenca, S. by Ciudad Real, W. by Caceres, and is mountainous in parts. Various minerals are found, but not much worked. Sheep, asses, goats, and fighting bulls are reared. Hives and silkworms are also kept. Some textiles, wine, spirit (aguardiente), oil, and chocolates are manufactured. See H. Lynch, *Toledo* (Med. Town Series). Pop. 410,277. 2. The cap. of above, on the Tagus, 50 m. S.S.W. of Madrid, and once cap. of all Spain. It has a fine Gothic cathedral (1227-1493), and interesting Moorish and Mudéjar remains. The great square or 'Zocodover' was once the scene of bull-fights and the burning of heretics. The fine old Alcázar was partially burnt in 1887. Toledan sword-blades were famous in Roman times, and fine steel cutlery is still manufactured near by. Pop. 24,000. See Ibañez Marin, *Recuerdos de Toledo*, 1893; Calvert, *Toledo*, 1907. 3. The cap. and port of entry of Lucas co., Ohio, U.S.A., on Maumee R., at the W. end of Lake Erie, about 92 m. from Cleveland. Manufs. include flour, malt, liquors, lumber, foundry-products, hides, wool, and tobacco. Its trade is carried on by means of the Great Lakes, canals, and numerous railways. Pop. (1910) 168,497.

Toledo, Don Pedro de (1484-1553). Marquis of Villafraanca, and son of the Duke of Alba, born at Alba in Tormes. In 1532 he was appointed viceroy of Naples, where he built the famous Toledo Street. His religious fanaticism led to a popular revolt. He died at Florence while leading an army against the French in Sienna.

Toledoth Jeshu (Heb. 'the sons of Jesus'), a

signed at T. in 1797 between Napoleon and Pope Pius VI., and here in 1815 the Austrians defeated the French under Murat. Pop. (coin.) 13,500.

Toleration, in religion, now considered the natural right of the

It is not a direct offspring of the Reformation, but rather of the humanitarian and liberal movements which followed it. Largely also, it is due to religious indifference.

Tolima, a dept. of Colombia. Area 10,900 sq. m. Cap. Ibagué (12,000). The volcano of Tolima rises 18,125 ft., the highest peak in Colombia. Pop. (est.) 200,000.

Tollens, Hendrik Caroluszoön (1780-1856), a Dutch poet, born in Rotterdam. He attained popularity by celebrating heroic deeds in Dutch history in a series of lyrical romances which possess great vitality and charm. Among his works are the comedies *De Bruijloft* (1799) and *Gierigheid en Baatzucht* (1801); the tragedy *Konstantijn*, and the poems *Romanzen*, *Balladen*, en *Lependen* 1818; *Nieuwe Gedichten*, 1840; and *Laatste Gedichten*, 1848-53.

Tolls, a tax imposed in consideration of some privilege. In the feudal system it meant the right to tollage one's villeins. Later it became the distinguishing mark of a turnpike road, i.e. a road having toll-gates or bars on it, called 'turns.' These 'turns' appear to have been first constructed about the middle of the 18th century, when certain interested individuals subscribed among themselves for the repair of various roads, and exacted a T. for the privilege of using the roads so repaired. The popular resistance to these exactions led to the passing of Acts to regulate T. These turnpike roads are now extinct. Where a claim to demand T. is made, there is a distinction between a *toll thorough* (through) and a *toll traverse* (across); the former being granted in consideration of the performance of a continuing beneficial service, such as the repair of a road or the maintenance of a bridge or, if permitting the

pass over the land of

e toll. Carriages and military service are

translation was in 1681.

Tolentino (ancient *Tolentum Picenum*), a tn. of Macerata prov., Italy, 11 m. S.S.W. of Macerata. The cathedral and the church of San Catero are interesting. A treaty was

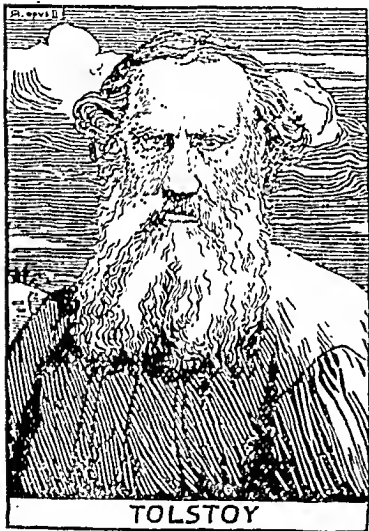
exempt from payment. Other kinds of T. are *port-tolls*, or charges on goods carried into a port; *turn tolls*, or charges on cattle driven to market and returned unsold, and T. levied by railway companies, as a statutory authority, upon merchandise carried

on their lines. See Pratt, *Law of Highways*.

Tolmezzo, a tn. of Venetia, Italy, in the Alps (alt. 1000 ft.) on the Taglianento, 26 m. N.N.W. of Udine. Pop. 5200.

Tolosa, a tn. in the prov. of Guipuzcoa, Spain, 15 m. S.W. of San Sebastian. It manufs. copper-ware, paper, leather, and arms. Pop. 8200.

Tolstoy, Count, Leo Nikolaievitch (1828-1910), a Russian novelist, poet, and social reformer, of noble family born at Yasnaya Polyana in the government of Tula. Being left an orphan at the age of nine, he was brought up by an aunt, and with his brothers studied under a French tutor until 1843, when he was sent to the University of Kazan. He did not distinguish himself scholastically,



and on leaving college gave himself up to pleasure for some years. In 1851 he joined the Russian artillery in the Caucasus, and on the outbreak of the Crimean War took command under Prince Gortchakov and fought at Silistria (1854), and at Sebastopol (1855). During these stirring times he wrote a series of brilliant war sketches entitled *Tales from Sebastopol* which made him famous among literary circles in St. Petersburg. He had previously contributed to the Russian *Contemporary*, and had written *Child-Morning*; *Boy-Cossacks*. On his return to St. Petersburg after the war he was welcomed into the gayest

social circles and the most exclusive literary cliques. At this time he won the admiration of Turgenev, but the respect they had for each other did not grow into anything warmer on account of their fundamental differences of opinion. T. now came under the influence of the progressive socialistic movement in Russia, and freed the serfs on his estate. His novel, *Polikushka*, shows how deeply he was moved by the wrongs of the peasants. In 1862 he married Sophia Behrs, and henceforth gave himself up to studying and supplying the needs of the poor. He now began his two great masterpieces, *War and Peace* and *Anna Karenina*, and in 1880 published his religious experiences in *My Confession*. His later works were written with a conscious didactic aim, and include *Ivan Ilyich*, *Kreutzer Sonata*; *The Kingdom of God is within You*; and *What is Religion?* In 1895 he renounced his property, gave up all his money and worldly goods, and henceforth lived the life of an ordinary peasant. His *Works* were translated into English by N. H. Dole (19 vols. 1889-90). See Lives by Blukoff (1905, 1906), Aylmer Maudo (1908, 1910), and R. Rolland (Eng. trans. 1911).

Toltees, a semi-legendary people of Mexico and Central America, to whom the Aztecs and Mayas ascribed many cities, monuments, and arts, whose certain origin was unknown. The legendary history of the great national hero, Quetzalcoatl (d. 895 A.D.), is found in *Historia de Colhuacan y de Mexico*. See Selser's *Commentary* (Eng. trans. by A. H. Keano). 1901-2.

Tolu, see BALSAM.

Toluca, or Toloacan, a tn. of Mexico, cap. of the state of Mexico, 36 m. W.S.W. of the city of Mexico. It manufs. cotton stuffs, flour, and wax candles. The Nevado de Toluca, an extinct volcano (14,950 ft.), lies S.W. of the town. Pop. 31,247.

Toluene, Methyl Benzene, or Phenyl-methane ($C_6H_5CH_3$), a mobile liquid (boiling-point $110^\circ C.$) which resembles benzene in most respects. It is prepared from the 90 per cent. benzol obtained from coal-tar and is used in the preparation of dyes.

Toluidine, the Ts. or amido-toluenes ($C_6H_4(CH_3)NH_2$), are prepared from the corresponding ortho-, meta-, and para-nitrotoluenes by reduction. Ortho- and meta- T. are oils boiling at 197° and 199° respectively. Para-toluidine is crystalline, melts at 45° and boils at $198^\circ C.$ The Ts. resemble aniline in all their reactions and the ortho- and para- compounds are employed in the manufacture of dyes.

Tom, a riv. of Siberia, after a N.W. course of about 400 m. joins the Obi, 40 m. N.W. of Tomsk.

Tomahawk, the war-hatchet of the N. American Indians. Originally they were composed of a stone head tied to a wooden handle by leather thongs. One end of the stone was sharpened and the other hollowed into a pipe bowl, to which the hollow handle acted as stem. Subsequently steel and iron heads were introduced by Europeans.

Tomaszov, or Tomaszov Fabryeny, a tn. of Piotrkow gov., Russian Poland, 41 m. N.E. of Piotrkow, with manufs. of woollens, flour, and iron goods. Pop. 21,000.

Tomato, or *Lycopersicum esculentum*, an annual plant (order Solanaceæ), bearing globose red or yellow fruit, formerly known as 'love apples,' which within a few years came into immense popularity in Britain, its production, chiefly under glass, now being a large and important industry. Except in sheltered and especially favoured situations, and when the season is sunny, the culture of the fruit out of doors is unsatisfactory. The plants are raised from seed early in the year in warmth. The plants are confined to a single stem, shoots at the axils of the leaves being regularly pinched out. Liberal watering and manuring are necessary while the fruit is setting. Late fruit may be ripened in the dark in a temperature of 50 degrees.

Tomb (Gk. *τύμβος*), signifies, in its strict meaning, a mass of masonry or stone-work raised immediately over a grave or vault used for interment; but it is often applied, in a wider sense, to any sepulchral structure. Of primitive sepulchres there are two classes—one subterranean, the other of raised mounds or tumuli. Monuments of the first kind are numerous in Egypt; the Pyramids, though more artificial in form and construction, had no doubt a common origin with the Tumulus. At some places in Etruria the Ts. are hewn out on the sides of rocks and hills, and present an architectural façade forming their entrance. Sepulchral edifices are numerous throughout Latium and Magna Græcia, many of which must have been remarkable on account of the architectural decoration bestowed on them. The Ts. of the middle ages are within buildings, churches, chantries, cloisters, etc., and exhibit almost every variety of form and enrichment, from the primitive stone coffin to the lavishly-decorated canopied monuments. Another class consists of *Altar* or *Table Tombs*. The next in order is the *Effigy Tomb*, first introduced in the

13th century, with a recumbent figure of the deceased upon it, extended, with the hands slightly raised and joined as if in the attitude of prayer. Altar and Effigy Ts. were usually placed between the piers of an arch, or within a recess in a wall, and in either case the whole T. was frequently covered by an arch forming a sort of canopy over it; of which kind is that of Aymar de Valence in Westminster Abbey.

Tombao, an alloy of 16 parts copper, 1 part zinc, and 1 part tin. Red T. consists of 10 parts copper to 1 of zinc, and white T. of 75 per cent. copper and 25 per cent. tin.

Tombigbee, a riv. of U.S.A., rises in Prentiss co., Mississippi, and flows S. to unite with the Alabama R. to form the Mobile R. Length 500 m.

Tomí (later *Tomisicar*, or *Jegni Pangola*; modern *Kustendje*, or *Constantia*), a tn. of Thracæ (later *Moessia*) on W. shore of the Euxine. It was once capital of Sorthia Minor, and is famous as the place to which Ovid was banished. T. was colonised from Miletus (c. 600 B.C.).

Tommaseo, Niccolò (1802-74), an Italian writer and politician, born at Sebenico, Dalmatia. Early in life he acquired an interest in public affairs, and attached himself to the Italian Liberal party, in 1848 becoming Minister of Public Instruction. He was sent to Paris to seek the aid of France, and after the capitulation went first to Corfu and later to Tunis and Florence. It was at the first named (Corfu) that he wrote his famous *Supplizio d'un Italiano*. He was a prolific and varied writer, amongst his most important publications being: *The Duke of Athens* (novel), *The Second Exile, Italy* (political writings), *A New Dictionary of Synonyms of the Italian Language*, etc. His *Letters* were edited by Verga (1904).

Tompkins, Daniel D. (1774-1825), an American politician, was governor of his native state of New York from 1807-25, and rendered signal service to his country during the war with England in 1812 by making himself responsible for the efficiency of the New York militia.

Tomsk: 1. A gov. of W. Siberia, Russia, 327,173 sq. m. in area, bounded N.W. by Tobolsk, W. and S. by Sempalatinsk. S.E. by N.W. Mongollia, E. and N.E. by Yoniskak. This vast tract is densely wooded in the N., contains the fertile but marshy Baraba steppe below, and still further S. the valleys and Alpine tracts of the Altai Mts. The Obi with its tributaries is the chief river. Corn and tobacco are cultivated, mining is carried on, and draught horses

are reared. The inhabitants are mainly Slavs (90 per cent. Russians), Ostyaks, Tartars, nomad Samoyedes, and Mongol tribes being found also. Pop. 3,170,300. 2. The cap. of above, an episcopal see, the largest city of Siberia. A branch line connects it with the great Siberian railway at Taiga, and there is steamer communication with Barnaul and Bijsk and up to the Urals. The university dates from 1888. The chief industries are tanning and the manuf. of carriages. Pop. 107,711.

Tom Thumb, *see* DWARF.

Tomtit, *see* TIT.

Ton, or Tun, a measure of weight, equivalent to 20 hundredweight. In England each hundredweight (cwt.) contains 112 lbs., so that the T. has 2240 lbs., but in parts of the United States only 100 lbs. is reckoned for each cwt., bringing the value of the T. to 2000 lbs. The former is known as the 'long' T., the latter as the 'short' T. *See* TONNAGE.

Tonalite, a type of quartz diorite found in the Adamello Alps. Plagioclase quartz, hornblende, and biotite are dominant minerals, with magnetite zircon, etc., as accessories. The granite-diorites of the U.S.A. are similar rocks, and the type is also found among the Scottish plutonic rocks.

Tonawanda, a tn. of New York, U.S.A., in Erie co., on the Erie Canal, with shipbuilding, iron working, and lumbering industries. Pop. (1910) 8290.

Tonbridge, or Tunbridge, a tn. of Kent, England, on the Medway, 27 m. S.E. of London. It has a 16th century grammar school, and is famous for its inlaid wood ware. Pop. (1911) 14,797.

Tone, in music, is the interval of a major second. It is also used to indicate the quality of a sound.

Tone, Theobald Wolfe (1763-98), a United Irishman, was called to the Irish bar in 1789, but devoted himself to politics, and printed articles attacking the government and in agitating against it. He went to the United States in 1795, and in the following year to Paris, where he was active in efforts to promote an invasion of Ireland. He was given a command under Hoche, whose expedition did not effect a landing. He was captured in 1798 on a vessel in Hardy's squadron, and was tried by court-martial, which sentenced him to death for treason. His *Autobiography* was published in 1893.

Tonga Islands, *see* FRIENDLY ISLANDS.

Tongaland, *see* AMATONGALAND.

Tongariro, a group of volcanic mountains in the N. part of the North Island of New Zealand, Wellington

prov., 20 m. S.S.W. of Lake Taupo. The northern plateau, to which the name is generally confined, has eight craters. To the S. is Ngauruhoe (7515 ft.), which was in eruption in March 1909. The Red Crater and Te Mari are also still active.

Tong-king, or Tonquin: 1. A French possession of N.E. Indo-China, Asla (acquired 1884), forming with Laos (acquired 1892) one of the five French dependencies in Indo-China. It is bounded N. by the Chinese provinces Kwang-tung, Kwang-si, and Yun-nan; W. by Laos; S. by Annam; E. by the Gulf of Tong-king. The Song-Koi or Red R. flows from N.W. to S.E. The mountainous, plateau, and forest land lies chiefly N. and W.; there is flat, low-lying fertile land to the S.E. Area 46,400 sq. m. There are a number of small islands off the coast. Gold, silver (at Ngan-son), antimony, tin, and coal (at Hongai) are found. Teak, ebony, and sandalwood are the most valuable woods produced. Round the deltas of the Red R. and the Thal-binh rice is extensively grown. In other parts are plantations of coffee, tobacco, ramie, cotton, jute, sugarcane, and mulberry. Vegetables, betel-palms, areca-nuts, bamboos, hemp, indigo, gamboge, pepper, and cinnamon are also produced. The litchi (liehee or leechco) tree is a native of T. Haiphong is the chief port and Hanoi the capital. Hanoi replaced Saigon as capital of French Indo-China (1902), and is connected by rail with Haiphong and with Vinh. It has various mills, foundries, distilleries, and breweries, and a school of medicine for natives (opened 1902). T. formed part of the kingdom of Annam until the French residency was created in 1884. Pop. (1911) 6,119,720 (about 7000 Europeans). Consult Imbert, *Le Tonkin* . . ., 1885; Dupuis, *Le Tong-king*, 1898; De Lajouquiere, *Ethnographie du Tong-king Septentrional*, 1906; Galsman, *L'Œuvre de la France au Tong-king*, 1906. *See* INDO-CHINA, FRENCH. 2. Gulf of, an arm of the China Sea, of average breadth 150 m., receiving the Song-Koi. It is bordered by T., Kwang-tung, and Hainan Island.

Tongros (ancient *Tongri*), a tn. of Limbourg prov., Belgium, on the Jaar, 12 m. N.W. of Liège. It has distilleries, tanneries, and a mineral well, mentioned by Pliny. Pop. 10,200.

Tongue, a movable muscular organ attached to the floor of the mouth, and concerned in the operations of mastication, deglutition, speaking, and tasting. The T. consists of a mass of muscle symmetrically arranged about a middle line from tip

to root. The base is attached to the hyoid bone; the upper surface, or dorsum, is free; the edges and the anterior portion of the lower surface are free. A fold of the investing mucous membrane is situated in the middle line of the under surface; this is the *frænum linguæ*, or 'bridle' of the T. The substance of the T. is striped muscle. It is supplied by branches of the lingual artery, whose origin is the external carotid. The nerves of the T. are the gustatory, for touch and taste sensations, the glossopharyngeal, supplying the posterior third, and the hypoglossal, which conveys motor stimuli. The surface

or shrub, native of Guiana, bearing racemes of purple flowers followed by almond-like legumes. The beans are used in the manuf. of snuff, and are put amongst clothes to perfume them and to repel insects.

Tonkin, see TONG-KING.

Tonnage, of a ship is the measure of its cubical or carrying capacity expressed in tons. There are now in use four methods of expressing the T. of a ship, known respectively as the gross T., the net T., the dead-weight T., and the displacement T. Before 1836 (when the gross T. was in use a much rougher and more inadequate method of measurement) 'builders' T., which, referred to the gross T., the ship below the T. deck is found, together with that of all covered-in spaces on deck used for stowage, and the result in cubic feet is divided by 100, a 'register' ton being a measurement of space calculated from the average bulk of light freight. The net register T. is the gross T. minus all those spaces used for the working parts of the ship or for the accommodation of crew or instruments. It is on this T. that dues are almost invariably paid. The dead-weight T. is the measure of the weight that a ship can carry in her hold, and is the displacement T. is that in use since 1872 for all ships of war throughout Europe. The amount of water displaced by a ship is, of course, equal in weight to the ship and all that it contains. Since 35 cub. ft. of water weigh one ton, the displacement T. is found by dividing by 35 the number of cubic feet of water displaced when the ship is immersed to its draught or load-line.

liable to many morbid changes. By easily-recognised phenomena of furring, etc., the existence of disease of the alimentary canal is indicated. Acute inflammation is caused by wounds, and may lead to the formation of abscesses. Chronic inflammation is due to prolonged irritation, as by a broken tooth or excessive smoking. It may be followed by excessive growth of the surface cells leading to the formation of a cancer. Cancer of the T. is particularly painful and dangerous, the only hopeful treatment being early removal by surgical operation.

Tonic, in medicine, an agent which tends to re-establish the proper performance of the functions of the body in general, or of some particular organ. Ts. differ from stimulants in that the latter produce a transient effect rapidly, while the former gradually build up a permanent effect. Among general Ts. are vegetable bitters, cold baths, exercise, etc.; iron and arsenic are blood Ts.; dilute acids are gastric Ts.; digitalis and strophanthus are cardiac Ts.

Tonic, in music, the fundamental key-note of a scale. See MUSIC.

Tonic Sol-fa, see SOLMISATION.

Tonikas, The, a tribe of N. American Indians, now practically extinct. They dwelt in E. Louisiana and Mississippi. In 1886 some twenty odd tribesmen were living in Marksville (Louisiana).

Tonite, an explosive formed by mixing fifty-four parts of wet gun-cotton pulp with forty-six parts of bromium nitrate.

Tonk: 1. Chief tn. of the native state of Tonk, Rnputana, India, near the Banas R., 60 m. S. of Jaipur. Pop. 38,760. The state has an area of 2752 sq. m. Pop. 275,000. 2. A tn. in the Dera Ismail Khon dist., N.W. Frontier Province, India. Pop. 4400.

Tonka, or Tonquin Bean, the seed of *Dipleryx odorata*, a leguminous tree

which, referred to the gross T., the ship below the T. deck is found, together with that of all covered-in spaces on deck used for stowage, and the result in cubic feet is divided by 100, a 'register' ton being a measurement of space calculated from the average bulk of light freight. The net register T. is the gross T. minus all those spaces used for the working parts of the ship or for the accommodation of crew or instruments. It is on this T. that dues are almost invariably paid. The dead-weight T. is the measure of the weight that a ship can carry in her hold, and is the displacement T. is that in use since 1872 for all ships of war throughout Europe. The amount of water displaced by a ship is, of course, equal in weight to the ship and all that it contains. Since 35 cub. ft. of water weigh one ton, the displacement T. is found by dividing by 35 the number of cubic feet of water displaced when the ship is immersed to its draught or load-line.

Tonnage and Poundage. Tonnage, a tax of from 1s. 6d. to 3s. levied on each tun of wine or liquor imported into or exported from the United Kingdom; and poundage, a similar tax of 6d. to 1s. on every pound of dry goods, were first levied in 1371. James I. claimed to alter the rates of levy as he chose by means of additions called *Impositions*, and managed through his servile judges to secure a decision in his favour on the legality of such additions against the merchant rate. Parliament never ceased to protest against this infraction of their right to control taxation, and the resistance of Hampden to the collection of the tax precipitated the Civil War, after the close of which no further levy was ever made.

Tonnage Dues. Rates levied on the tonnage of ships entering ports or navigating public waters. Such rates

are imposed by local Acts; and the mode of computing tonnago for the purposes of the dues may be that set out in the particular local Act, or may, with the consent of the Board of Trade, be on the registered tonnago as ascertained according to the rules made under the Merchant Shipping Act, 1894. By the constitution of the U.S.A. no state may impose T. D. without the consent of Congress; but a municipal corporation may levy a wharfage rate on the owners of unused steamboats mooring at a wharf.

Tonnay-Charente, a tn. in the dept. of Charente-Inférieure, France, on the Charente, 4 m. above Rochefort; is an important river port, and exports Cognac brandy. Pop. 4900.

Tonnels, a tn. in the dept. of Lot-et-Garonne, France, on the Garonne, 10 m. S.E. of Marmande. It has a national tobacco factory. Pop. 6600.

Tonnere, a tn. of France, in the dept. of Yonne, on the Armançon R., 27 m. S. of Troyes, famous for wine. Pop. 4500.

Tonquin, *see* TONG-KING.

Tönsberg, a fort. seaport, Jarlsberg-Laurvik amt, Norway, near the Christiania Fjord, 72 m. W.S.W. of Christiania. It is one of the oldest towns in Norway (871 A.D.), and is the headquarters of the sealing and whaling fleet. Near here are the ruins of an ancient fortress and royal residence. Pop. 8600.

Tonsils, a pair of almond-shaped bodies situated in the fossa between the pillars of the fauces in the pharyngeal cavity. Each consists of a mass of lymphoid tissue plentifully supplied with blood vessels, and is covered with mucous membrane which dips into depressions called crypts. The T. secrete a viscous fluid which acts as a lubricant to the respiratory passages. Inflammation of the Tonsils, *tonsillitis*, is caused by the introduction of septic organisms through the mouth, or by way of the blood. It usually commences with slight rigors, and the characteristic swelling soon makes its appearance. The swelling is accompanied by pain, and swallowing and even breathing may be rendered difficult. The temperature rises and usually a certain amount of suppuration takes place. A yellowish secretion appears on the surface of the T., which may be brushed away or removed by gargling. Hot poultices should be applied to the neck, and if suppuration has taken place the T. should be stabbed to release the pus. The inhaling of steam mixed with antiseptic vapours is useful in relieving the condition. In *chronic tonsillitis* there often occurs a permanent

overgrowth of the substance of the T., which is best dealt with surgically.

Tonson, Jacob (c. 1656-1736), chief of the famous firm of publishers and second son of Jacob T., the surgeon. He was apprenticed to a stationer for eight years, and having been admitted a freeman of the Stationers' Company in 1677, began business on his own account. T. purchased Dryden's *Troilus and Cressida* in 1679, and in 1681 acquired the valuable property of a half-share in the rights of *Paradise Lost*, of which he bought the other half in 1690. Afterwards he became associated as publisher with the principal men of letters of his day, including such as Steele, Pope, Addison, Congreve, and Wycherley. Jacob T. retired from the business about 1720.

Tonsure, the cutting of the hair in a certain form as a symbol of self-dedication to the monastic life. The custom first appears in the end of the 4th or beginning of the 5th century. In the ancient Celtic Church all the front of the head was shaved in front of a line drawn from ear to ear. In the Oriental churches the whole head is shaved. In the Roman Church the 'coronal of St. Peter' has always been used. In this T. the crown of the head is shaved to leave a fringe of hair all round.

Tooke, John Horne (1736-1812), an English politician and philologist, took holy orders in 1760, but resigned his living in 1773. His Radical propaganda led to his being tried for high treason in 1794, but he was acquitted. He published in 1786 *The Diversions of Purley*, and was the author of many pamphlets. There is a biography by Alexander Stephens, 1813.

Tooke, William (1744-1820), an English historian and divine. He became chaplain of the English church at Cronstadt, and in 1774 chaplain in St. Petersburg. He published *Russia, 1780-83; Life of Catherine II.*, 1798; *History of Russia*, 1800.

Toole, John Lawrence (1832-1906), an English actor, went to the City of London School and soon deserted a wine merchant's office for the stage. For him the years 1852 to 1896 were one perpetual round of acting, now in Edinburgh, now in London, where he played at the Adelphi (1858-67) and at his own theatre (1882-95), now in America, where he was a comparative failure (1874), later in Australia, where he was a complete success (1890), and finally in the provinces, where he made an annual tour from 1857 onward. Characterised often as 'the last great low comedian of the old school,' T. excelled, nevertheless, in serio-comic parts, like Michael

Garner in Byron's *Dearest than* . . . and an automatic Stephen Digges in the play of . . . is employed; of name, an adaptation of *Le* . . . town is put on the *Griol*, Caleb Plummer in *Dot—* market by Messrs. Vickers, Ltd. Boucault's version of the *Cricket* Owing to the great weight of certain objects which require planing, such as armour for battleships and the like, the energy for reversing the mass is much greater than that required for the actual cut, hence for such work the machines often have a fixed bed and movable T. But to-day planing is being largely superseded by *milling*, where a rod or disc has a serrated and sharp edge, shaped to the cut required. This milling-cutter is kept revolving at a high rate of speed and quickly removes the surface presented to it; whereas a planer can only remove at the outside limit a piece of material $\frac{1}{2}$ in. wide for each T., which seldom exceed four in number. Other T., which help to make the complicated mechanical productions of modern life are the drilling machine, the slotting machine, the shaping machine, and the boring machine.

Tools, Machine. Amongst the most important workshop T. are those for producing objects in which circularity plays a part. Such objects are innumerable, and their production dates back to very early times. It is, however, only recently that the *lathe* has been able to produce accurate work owing to the fact that it was only during last century that the *slide-rest* was invented, which affords a rigid support for the T. and can traverse it parallel to the piece that is being worked. The screw-cutting lathe has a slide-rest which is moved along at a uniform speed by gear wheels, which are in turn connected to the object on which a screw is to be cut: threads can be cut by this means from $\frac{1}{4}$ in. pitch upwards. Modern large lathes are used for gun work and for finishing the treads and cranks of wheels and axles. The Niles-Bement-Pond Co., have made a lathe 154 ft. between centres, weighing 165 tons, for boring and turning guns. On such lathes several T. are carried at once, performing different operations on various parts of the material. Turret lathes, both hand worked and automatic, play a large part in the production of articles which have to be produced in quantities. Turrets are usually hexagon and carry six T., thus permitting of six different operations on the object. Such lathes usually have a hollow headstock, through which a continuous bar of metal is passed. As an example, we may quote the manufacture of studs by which cylinder covers are held in place. First, the . . . through the headstock . . .

it is turned to . . . fourth operations screw cut it both ends and finally it is cut off. All these motions are performed entirely automatically by means of a trip action, which engages with the requisite stops. The next important piece of machinery is that for producing a truly level surface. The planing machine was invented about 1825 by Joseph Clement. In these machines the work moves under stationary T. on a rolling bed. If the work has only to be done in one direction, a quick return motion is employed, involving the use of two different sized pulleys; or else the drive is per-

Drilling machines on certain occasions are of the multiple variety, i.e. several spindles are worked at once, if it is necessary to drill a great many holes in a plate, such as a boiler fire-box or the like. Adaptors are also made nowadays for fitting taps into small drilling machines, so that it is possible to tap small holes by this machine, instead of having to use hand labour.

Shaping machines are really planers on a small scale with moving T., the mechanism employed is of the steam engine type, i.e. the T. is moved by means of a crank and connecting rod; it is used on light work for facing up cottars and the like.

Boring mills may be either horizontal or vertical; they are largely used for cylinders and guns, and the like. In these days of quadruple expansion marine engines it is necessary to be able to bore cylinders up to 12 ft. in diameter; or as regards length to be able to bore a hole 15 or 16 in. for some 60 ft. in length, as is necessary for big guns and large propeller shafts.

Lastly, the wood-worker has not . . . the universal . . . will cut holes . . . of any sort of shape out of wooden blocks, where formerly the work had all to be done by hand. See *Ency. Brit.* 'Tools'; Dunkerley's *Mechanism*.

Toombudra, or Tungabhadra, a riv. of S. India, the chief trib. of the Kistna, is formed by the junction of the Tunga and Bhadra which both rise in the Western Ghats. Length, 400 m.

Toothache, see TEETH.

Toothwort (*Lathraea*), a genus of plants (order Orobanchaceae), partly parasitic and partly saprophytic. *L. squamaria*, the only British species, has a fleshy branched rhizome clothed with tooth-like scales and bearing a raceme of drooping dull red flowers.

Toowoomba, a tn. of Queensland, Australia, 101 m. W. of Brisbane, is situated in a wine-growing and agricultural dist. It has tanneries, breweries, and flour mills. Pop. 16,160.

Topaz, a mineral crystallising in the rhombic system and having a perfect basal cleavage. It is a silicate of alumina with fluoride [$(\text{AlF})_2\text{SiO}_4$]. The colour of T. varies from yellow to white, blue or pink, and the mineral is more or less transparent ($H=8$, sp. gr. 3.5). On heating it becomes electrified (pyroelectric). T. is used extensively in jewellery; the pink colour of most of the jewellers' stones, however, is produced artificially, the stone being wrapped in amadou (tinder), which is ignited and allowed to smoulder away. In the British Isles the stone has been found in Cornwall, Aberdeen, and the Mourne Mts. Fine specimens are obtainable in Brazil, Peru, Ceylon, and Siberia. See STONES. PRECIOUS.

Tope, or **Stupa**, known as 'Dagoba' in Ceylon, is a structure erected by Buddhist monks to enshrine relics of Buddha or his disciples. The Ts. are surrounded by a massive stone railing with lofty gates. The most noteworthy is at Sanchi in Bhopal.

Topeka, the cap. of Kansas, U.S.A., and co. seat of Shawnee co., on the Kansas R., 58 m. W. of Kansas City. It is a large manufacturing centre, and in the vicinity are quarries and coal mines. Pop. (1910) 43,684.

Topelius, Zakris (1818-98), a Finnish man of letters, was professor at Heidelberg from 1863-78. Fortune smiled on him, whether he turned journalist, novelist, playwright, or poet. He edited the *Helsingfors Gazette* (1841-60); wrote five volumes of excellent historical fiction called *Tales of a Barber-Surgeon* (1853-67); witnessed a successful performance of his tragedy, *Regina von Emmeritz* (1854); and was gratified by the ready sale of his volumes of patriotic, smooth-flowing, and charming lyrics, entitled *Heather Blossoms* (1845-54).

Tophane, see CONSTANTINOPLE.

Tophet ('the place of burning'), a high place in the valley of Hinnom, where sacrifices used to be offered to Moloch.

Topiary, the pruning of trees and shrubs into formal and fanciful shapes. The art was most developed in the 16th century, and has been revived in recent years. It requires a

great deal of trouble and some skill to check the over-development of branches and shoots. No tree is better suited to T. than the yew, but the holly, box, and hawthorn bear training and clipping well.

Top-knot (*Zeugopterus*), a genus of flat fishes, two species of which occur in British seas, Miller's T. (*Z. punctatus*) and one-spotted T. (*Z. unimaculatus*), which is a more southern form than the other.

Toplady, Augustus Montague (1737-78), an Anglican divine and hymn-writer, born at Farnham, Surrey. He entered the Church in 1762, and became vicar of Harpford (1766) and Broadhembury (1768). In 1775 he became minister at the French Calvinist Chapel in London. His best known hymn is 'Rock of Ages'; in prose he wrote *Historic Proof of the Doctrinal Calvinism of the Church of England*, 1774.

Töplitz, see TEPPLITZ.

Topography (Gk. *τοπογραφία*, from *τοπος*, place; *γραφειν*, to write of), a written description of places. By custom the word is limited to the description of cities, towns, villages, castles, and churches, including notices of public buildings, history, trade, population, etc.

Topsail, see SAILS AND RIGGING.

Top-shell, a name for various gastropod molluscs belonging to the families Trochidae and Turbinidae, with shells somewhat resembling a pegtop in shape. The shells are pearly within and the external surface is generally highly ornamented and brightly coloured.

Torah, the Hebrew word for law. The word is generally used for the written law, i.e. the five books of the Pentateuch, though primarily it has no such special significance.

Torbanite, see BOGHEAD COAL.

Tor Bay, a fine harbour in the S.E. of Devonshire, England, well protected from westerly winds. It was the landing place of William of Orange (1688).

Torelli, Giuseppe (1721-81), an Italian mathematician, born at Verona. He edited in Greek and Latin all the works of Archimedes, the work of his lifetime, which was published posthumously by the Clarendon Press in 1792.

Torelli, Laelio (1489-1576), an Italian writer of noble birth, born at Bano. He became governor of Benevento and podestà of Florence, and in 1546 secretary to the grand duke of Florence. He wrote legal tracts and a Latin eulogium on Duke Alexander of Medici (1536), and edited the Florentine manuscript of the Pandects (1553).

Torena, Quelpe de Llana y Gayosa

de, Count (1840-90), a Spanish statesman, born in Madrid. He entered parliament in 1864, and remained faithful to the Bourbons during the period of revolution. After the Restoration he occupied many prominent positions.

Torenia, a genus of plants (order Scrophulariaceae), with racemes of finely-coloured flowers. They are often grown in hanging baskets in the greenhouse.

Torfaeus, Thormodus, or Thormod Torfason (c. 1640-1719), an Icelandic scholar and antiquary; studied at Copenhagen. King Frederick III. appointed him interpreter of Icelandic manuscripts, and a short time afterwards sent him to Iceland for the purpose of collecting manuscripts. The collection which he brought back is preserved in the Royal Library in Copenhagen. He became royal historiographer for Norway (1682). He wrote: *Hist. Rerum Norvegicarum*, 1711; *Hist. Rerum Orcadensium*, 1715; *Series Dynastiarum et Regum Daniae Groenlandiae Antiqua*, 1705; and translated several Icelandic works into Danish. See Erichsen, *T. Lorfesens Kevnets-beskrivelse*, 1788.

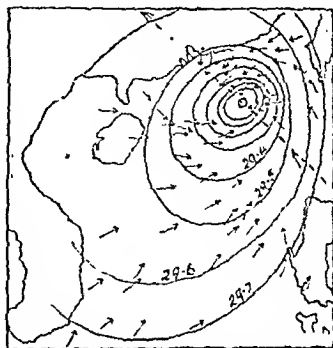
Torgau, a tn. of Prussia, in the prov. of Saxony, on the Elbe, 30 m. N.E. of Leipzig. Its fortifications were levelled in 1889. Glass, pottery, and gloves are made. Pop. 13,491.

Torjok, or Torzhok, a tn. in the gov. of Tver, Central Russia, on the Tvertsa, 36 m. W.N.W. of Tver city. It is a river port, and manufactures leather. Pop. 15,120.

Tormentil (*Potentilla tormentilla*), a small trailing plant (order Rosaceae), with yellow flowers, common on heaths and dry banks.

Tornado, a cyclonic disturbance of the atmosphere, occurring usually in the S.E. of a slow-moving 'primary'; most common in U.S.A., E. of 100° W. long., but particularly in Kansas and Illinois. Usually it arises suddenly in sultry summer afternoons. They are of small diameter, a few hundred yards, but of great proportional vertical height. The upper portion is marked by a swirling funnel-shaped cloud which sways and rises and falls. Local surface conditions give rise to rapid heating of a column of moist air by the sun, and sudden expansion takes place; the condensing moisture adds to the temperature of the whirling air and very low pressure results. The force developed cuts a clean path through town or country; trees are uprooted and whirled outside the track; houses are 'burst' by their own internal pressure as the low pressure encloses them; the damage to houses often leads to escape of gas

and disastrous fires. The tract extends usually for about 30 m., and the energy is dissipated in about an hour. A very destructive T. visited S. Wales in Oct. 1913, springing up near Merthyr-Tydvil and dissipating in



Cheshire. The water-spout at sea is a similar phenomenon. See Mill, *Realm of Nature* (new ed.), 1913; Davis, *Elementary Meteorology*, 1894.

Tornea, a tn. of Uleåborg gov., Finland, at the head of the Gulf of Bothnia, where it is entered by the R. Torneå, which forms the boundary between Finland and Sweden. Pop. 1400.

Toro, a city of Zamora prov., Spain, on the r. b. of the Douro R., 37 m. W.S.W. of Valladolid. T. is an ancient fortified city, containing a Romanesque cathedral (12th century) and the Santa Cruz Palace, the meeting-place of the Cortes of 1371, 1442, and 1505. It has a trade in fruit and wine. Pop. 8500.

Torontal, a co. of S.E. Hungary, bounded on the E. by the Temesvár. Cap. Beeskerek. Area 3650 sq. m. Pop. 546,000.

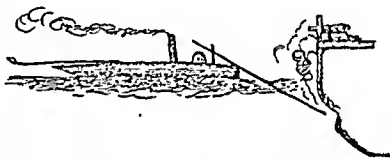
Toronto, the cap. of the prov. of Ontario, Canada, on the Bay of Toronto, on the N. shore of Lake Ontario, 333 m. S.W. of Montreal. In population and as a commercial centre Toronto is the second city of Canada, and is connected with all parts of the U.S.A. and Canada by fast steamers and by the Grand Trunk, Canadian Northern, and Canadian Pacific railroads. Its chief manufactures are iron rails, agricultural implements, pianos, and bicycles; there are gas works, electric plants, breweries, distilleries, foundries, flour mills, etc. In 1912 its imports realised 97,144,992 dollars, and its exports 45,818. The vessels arriving at T. in 1911 numbered 3192, with a tonnage of 1,649,837. The Stato Uni-

versity of T., founded in 1827, has over 5000 students. Other interesting buildings in the town are St. James's (Anglican) and St. Michael's (Roman Catholic) cathedrals, the Law, University, Legislature, and Public libraries, and the various colleges—Knox, Wycliffe, St. Michael's, etc.—federated with the university. There are several parks, including Queen's, Riverdale, Czowski, and Victoria. Pop. 376,538.

Torpedo, or **Electric Ray**, a genus of fishes, one species of which (*T. hebelans*) is occasionally found off the coast of England. Ts. are characterised by the possession of an electric organ which is present between the head and the pectoral fin of each side. The shock which it is capable of administering can disable a man.

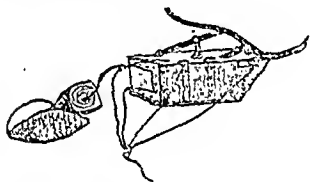
Torpedo. The use of submarine mines (*q.v.*) and Ts. date from the American War of Secession, when twenty-eight vessels were blown up by the former and six by the latter. Whitehead's T. was due to ideas of Captain Luppulus of the Austrian navy, but was first practically evolved by Whitehead in 1866, whose practical mechanical skill completely altered the original ideas. The first type was too uncertain in vertical direction, but the introduction of the 'balance chamber,' in 1868, obviated the troubles of skimming and diving. The secret was purchased by the British government after successful trials, and in 1876 the servo-motor was added by Whitehead. Further designs were made in 1884 and 1889, and some thirty patterns have been evolved. The modern weapon is 14 to 19 ft. long, the same number of inches maximum diameter, and cigar-shaped. In the fore compartment is placed the charge of gun-cotton (in war time), behind this is the air-chamber filled with compressed air, from pumps aboard ship, for giving motor power; behind this is the balance-chamber, with the steering and balance gear; this is followed by the engine-room, and finally another air-chamber for purposes of buoyancy. There are two screw-propellers working oppositely, two horizontal rudders and two vertical ones, which are much smaller. Non-corrodible metal, phosphor-bronze, is used for the body. Fitted to the nose is a pistol for firing the charge, the 'cap,' consisting of a primer charge of 6-oz. discs of dry gun-cotton and a detonating charge of 38 grains fulminate of mercury. The striker projects in front of the nose; on firing the T. a safety pin is first removed which allows motion of a fan on a screw due to motion in the water. After 40 ft. of travel the fan

has unwound itself and releases the trigger which is still held by a copper pin; on striking, the pin is sheared and the striker explodes the cap. For purposes of practice teak packing takes the place of the charge and a Holme's light, calcium phosphide, is arranged so that the T. may be easily located and picked up again. The *air-chamber* is of Whitworth compressed steel, and the air is at a pressure of 1350 lbs. per sq. in., equivalent to a weight up to 63 lbs. The *balance-chamber* contains a gyroscope working at several thousands of revolutions per minute, which prevents deviation. In addition, there is a hydrostatic valve working with a spring and a pendulum swinging fore and aft. These operate the rudders. The valve spring is only pressed in when the desired depth is attained, and the pendulum, not released till this depth is reached, by tilting forward if the nose dips raises the horizontal rudder; if the nose rises the reverse action takes place. This delicate control of lovers is insufficient to produce the required power when the T. is at good speed,



and a servo-motor, in the engine-chamber, working by compressed air, supplies power in much the same way as the steering engine does for the ordinary belmsman. The *engines*, made by Messrs. Brotherhood, are single-acting 3-cylinder ones; they develop a power of 30·8 h.p. in the Mark VIII. T. The supply of air is carefully regulated; a stop valve prevents leakage; a charging valve admits air to the charging reservoir; a starting valve admits air to the engines, and delay-action valves by means of a trip-lense prevents starting till the T. enters the water. A reducing valve regulates the supply during the journey, keeping the engines at a steady speed. The *Brennan T.*, used in harbour protection, and under the military authorities, was invented by a watchmaker of the name of Melbourne, and purchased in 1882 by the British government. It is not now in official use. It differs from the Whitehead particularly in its motor and steering gear, both being controlled from shore by means of two steel piano wires wound on large drums driven by a high-pressure engine. These are

wound round two small drums inside the T., and the winding up on the shore drums causes a very rapid unwinding of fine wires on reels carried on the two propeller shafts which work in opposite directions. The speed of the T. thus increases with the pull of the shore wires. By an ingenious arrangement of a collar on a hollow shaft, working on a thread on the propeller shaft, a difference in speed of the shore drums, by causing the collar to travel, actuates the rudders, giving a steering radius of 40° either side 'right-ahead.' A flag or Holme's light enables its course to be followed and directed by the operator. The *Schwartzkopff* T. is in use in the German and Japanese navies, and is similar to the Whitehead. The *Howell* T., used in the U.S.A. navy, is different in its compartments, and is peculiar in being driven by a fly-wheel connected to bevel-gearing. Motion is imparted to this before launching by a special steam-engine on board ship, the velocity being about 150 revs. per sec.; the fly-wheel weighs about 100 lbs.



This acts as a gyroscope, but the hydrostatic valve and pendulum steering mechanism is used. The *Sims-Edison* T. is also cable controlled, but the motive power is electricity; it is attached by stays to a copper float, which carries vertical rods with ball tops for observation from shore. It has the advantage over the Brennan in that it can be steered in any direction whatever. The *Maxim* T., following the Brennan in principle; the *Nordensfeldt*, driven by self-contained electricity; the *Lay*, used in the Chile-Peruvian War, are other notable examples. The motive power is with heat supplied to regulate pressure used in the Whitehead in the passage of air to the engine; the 'Elswick' heater, Armstrong, Whitworth & Co., causing a spray of alcohol to ignite in a combustion chamber through which the air passes. The *Bliss-Learitt* T., adopted by U.S.A., is turbine-driven, the engine developing 130 h.p. yet weighing only 20 lbs. A number of attempts to direct the T. by wireless electricity have been

made in the Fiske, Govan, Quorodo, and Orling-Armstrong machines. The last named, when travelling, throws up a column of water, which serves for observation as well as a mast to receive the electric waves which direct the steering; it has further the advantage of only temporary derangement on being struck by projectiles. As yet, however, the Whitehead is the most efficient type; it has a range of about 7000 yds. and can attain a maximum speed of 50 m. per hour for part of its course. The *spar* T., carried on the end of a spar at the bows of a vessel, was very successful in the American War of Secession; but although it is still retained in practice, it is doubtful if it will stand the test of modern warfare with its quick-firing and machine guns. The spar is arranged to lower the T. below the water-line just before striking. With modern higher speed vessels it is fixed aft, with the T. toward the bows; on lowering the T. swings outwards as the vessel passes the objective. It is fired by wires leading from a battery. It may prove useful in modern warfare in the attack on booms or other obstructions in harbours, etc. See publications of the Torpedo Station, Newport, Rhode Is., 1874-1901; Jaques, *Torpedoes for National Defence*, 1886; Lieut. Armstrong, *Torpedoes and Torpedo Vessels*, 1896; Sleeman, *Torpedoes and Torpedo Warfare*, 1889; Bucknill, *Submarine Mines and Torpedoes as a* 1889; Insti-

gineering—School of Military Engineering).

Torpedo Boat. The first T. B. was built by Messrs. Thornycroft for the Norwegian government in 1873, for the 'towing' type of torpedo. In 1877 the same firm built the *Lightning* for the British government; she was fitted with tubes in 1879. This same year saw the construction of the *Baloum* for the fitted with two and carrying

pedoes; her speed was 22 knots. Up to 1884 many were built for foreign (Russia had then 115), only nineteen. During fifty-four first-class down. A length of about 125 ft. was the lowest limit for sea-going vessels, smaller ones being built for harbour and coast work. The great considerations for T. Bs. are speed and small size; these rendered the experimental stage unsatisfactory and it was found almost impossible to make them serviceable owing to sickness in the crew. Nowadays the sea-going vessels, with their increased size, are thoroughly satis-

factory. Oil fuel, water-tube boilers, and turbines are used in the latest vessels.

Torpedo Destroyers. The first British vessel of this type, intended to destroy torpedo boats, was Messrs. Yarrow's *Havock*. The *Bozer*, 1895, was 200 ft. long, 19 ft. beam, draught from 6 ft. forward to 7'8 aft; displacement, 250 tons; speed, 29'17 knots. The hull was of finest steel, about $\frac{1}{2}$ in. thick; armament, one 12-pounder and three 6-pounders, with two revolving tubes. In all early types the form of engine was the triple expansion reciprocating, but modern boats are fitted with turbines. A boat built in England for the Brazilian government has a length of 331 ft.; breadth, 32 ft. 6 in.; draught, 9 to 10 in.; a displacement of 1830 tons; and a speed of 31 knots per hour. It carries both coal and oil fuel, which will carry it for 4000 nautical miles. The armament consists of 4-in. quick-firing guns, four maxims, and three 18-in. torpedo tubes. Speed being all important, defensive armour is out of the question; such boats are practically machinery with the lightest and most rigid form of shell to contain it.

Torpedo Ejector, or Torpedo Tube, a form of gun for ejecting torpedoes. The T. is placed inside and a swinging door closed behind. It is made to fit fairly tight, and a charge of gunpowder, or the impact of compressed air, gives the motive power. The submerged tube has also an outer cap and a sluice valve for draining water out; before firing the cap is removed and the tube flooded. A guiding bar, with automatic device for releasing the T., is also fitted and controls the weapon till it is clear of the ship. Above-water tubes are of many patterns, but compressed air or 4-4½ pebble-powder cartridges are used for ejection. Revolving tubes are used on torpedo boats and destroyers, allowing for aim apart from the steering of the vessel.

Torpedo Gunboats, or Torpedo Catchers, have been superseded by the destroyers. The first vessel of the type was the German *Zeiten*, built by the Thames Iron Works Co. The first English vessel was the *Scout*, 1580 tons; length, 220 ft.; beam, 34 ft.; 3200 h.p.; speed, 17 knots. The *Rattlesnake* carried a 4-in. breech-loading, and six 3-pounder quick-firing guns, and was fitted with two tubes. The speed of T. Gs. was at most about 20 knots.

Torpedo-nets, are suspended from hollow steel spars round vessels as a protection against torpedoes. The spars are placed 45 ft. apart and the nets, measuring 20 ft. by 15 ft.,

weighing 400 lbs., are fitted with heavy chains at their lower ends to keep them upright in a current or when the vessel is under way. They consist of a mesh of steel wire grumets, 6 in. diameter, connected with galvanised steel wire rings; each net is attached to the ship by a wire rope passed through several meshes at the bottom.

Torpedo-net Cutter, an implement fitted to the nose of a torpedo to enable it to cut the mesh of the torpedo-net and so penetrate to the vessel. That used in the British navy is the invention of Sir A. K. Wilson, and will cut the toughest and heaviest nets. Details are kept secret, but most cutters are scissor-acting wire cutters worked by powerful springs or the momentum of the torpedo on impact, or by special explosion.

Torquatus, the name of a patrician family of the gens Manlia. *Titus Manlius Imperiosus*, a favourite hero of Roman story, fought against the Gauls (361 B.C.), winning his name T. by taking the necklace (*torques*) from the body of a mighty Gaul slain by him in single combat. He was dictator 353 and 349, and consul 347, 344, and 340. With P. Decius Mus he defeated the Latins at the foot of Vesuvius. (See Livy, iv. 5, viii. 3-12; Cic. *De Off.* iii. 31.) *Titus Manlius*, conqueror of the Sardinians, was consul 235 and 224, and censor 231 B.C. With the hereditary sternness of his family he opposed the ransom of the Roman prisoners of Cannæ in the Senate (216). He was dictator in 210. *Lucius Manlius*, consul with Cotta (65 B.C.), helped to suppress Catiline's conspiracy (63), and supported Cicero in his exile (58). *Lucius Manlius*, son of above, was prætor 49 B.C., and opposed Caesar on the outbreak of civil war. Obligated to surrender Oricum, he was taken prisoner (48), but released. He fought again in Africa, but was captured and slain (16) on the defeat of the Pompeians. *A. Manlius*, friend of Cicero, presided at the trial of Milo for bribery as prætor (52 B.C.). He sided with Pompey in the civil war, and was an exile at Athens (45).

Torquay, a municipal bor., seaport, and watering-place, on Tor Bay, S.E. Devonshire, 20 m. S. of Exeter. Its picturesque scenery and mild climate make it a favourite health resort. Terra-cotta clay and marble are found in the neighbourhood. Pop. (1911) 38,772.

Torquemada, Thomas de (1420-98), founder of the Spanish Inquisition; wrested from Queen Isabella a promise to take all steps towards the extirpation of heresy. The 'Holy Office' accordingly was established

in Spain, and T. acted for eighteen years as inquisitor-general, burning, it is said, as many as 10,000 martyrs. See Rafael Sabatini, *Torquemada and the Spanish Inquisition*, 1913.

Torques (Lat. *torqueo*, I twist), a species of gold ornament, worn round the neck, much in use in ancient times. It consisted of a spirally-twisted bar of gold, bent round nearly into a circle, with the ends free, and terminating in hooks, or sometimes in circles.

Torre Annunziata, a seaport of Italy, prov. of Naples, 14 m. S.E. of the town of Naples. It has a royal manufactory of arms, and manufs. macaroni, paper, meat pies, etc. Pop. 28,084.

Torre del Greco, a watering-place and fishing ta. of Italy, in the prov. of Naples, situated at the foot of Vesuvius, which has often damaged the tn. by eruptions. Pop. 35,500.

Torrens, Lake, a large salt lake of S. Australia, discovered by Eyre, 35 m. N. of Port Augusta. Its average breadth is 20 m., length 130 m. It becomes a marsh in dry weath.

Torrens, Sir Robert Richard (84), an Irish colonial statesman, treasurer and registrar-general first legislative council of S. Australia, and was afterwards a member of the first ministry. In accordance with his Real Property Act of 1857, title to land is conveyed by public registration instead of by deeds.

Torrens, William Torrens M'Cullagh (1813-94), an Irish social reformer; sat as assistant on the special commission through whose agency the workhouse system was extended

by publishing the *Free Nations* the anti-Corn Law movement. In 1868 he introduced the Artisans' Dwellings Bill as an instrument for aiding in the clearance of slums, and it was owing to his amendment that in 1870 the London School Board was established.

Torre Pellice, or La Tour, a tn. of Turin prov., Piedmont, Italy, 17 m. from Saluzzo. It is a much frequented summer resort, and the headquarters of the Waldenses. Cotton-weaving, silk-spinning, and dyeing are carried on. Pop. 6000.

Torres Strait, in the S. Pacific Ocean, between New Guinea and Australia, from 80 to 90 m. broad. It contains several islands, the chief of which are Clarence and Prince of Wales Is. Reefs and shoals abound, rendering navigation difficult.

Torres Vedras, a tn. with a Moorish citadel, on the Sizandro, 26 m. N.N.W. of Lisbon by rail, in Portugal. It figured in the Peninsular War. Pop. 7000.

Torre Vieja, a small seaport of Alicante, Spain, 28 m. S.W. by S. of Alicante, with a large trade in salt. Pop. 8000.

Torricelli, Evangelista (1608-47), an Italian physicist, acted for three months as Galileo's secretary, and was prompted to many of his discoveries by the study of that scientist's works. Besides making a barometer—an invention commemorated in the names Torricellian tube and Torricellian vacuum—he solved the problem of the quadrature of the cycloid, and arrived at many fundamental truths in mechanics and hydrostatics. *Opera Geometrica* (1644) is his principal work.

Torridon Sandstone, in geology, the name given to the series of thick bedded chocolate-coloured sandstones (8000-10,000 ft.) which are exposed in Scotland round Loch Torridon. The Torridonian rests unconformably upon

quartzite and Scottish Cambrian rocks.

Torridon Sandstone (1870, 1890)

Rome, where he was employed by Pope Alexander VI., and afterwards served as a soldier under the Duke Valentino. His talents recommended him to the favour of Henry VIII., for whom he executed a variety of things, but his chief work was the tomb of Henry VII. in Westminster Abbey, which he completed in 1519.

Torrington: 1. A bor., 24 m. W. of Hartford, on the Naugatuck R., in Litchfield co., Connecticut, U.S.A. Pop. (1910) 16,840. 2. Or Great T., a market tn. on the Torrildgo, 6 m. S.S.E. of Bideford, in Devonshire, England. In Saxon days it was called Torritone. Pop. (1911) 3041.

Torrington, Viscount, see BYNG, GEORGE.

Torsaker, a tn. in the län of Gefleborg, Sweden, 25 m. W.S.W. of Gefle. Pop. 7771.

Torsion, a strain produced by a twisting motion, that is, by a couple acting in a plane at right angles to the axis of a prism. The distortion produced is a type of shearing stress. In the case of a cylinder the outer layers slide over the inner layers in the direction of the twist, so that, while the axis remains the same, the exterior takes on a screw-like appearance. Resistance to torsion determines the rigidity of the bar, and resistance to permanent distortion depends upon its elasticity. The amount of 'torque' or twist required to produce T. in cylindrical bars of the same material varies as the fourth

power of their diameters. In bars of section other than circular the rigidity is lessened, so that in practical application cylindrical bars are best adapted to resist a twisting strain.

Tort (Lat. *fortus*, twisted) is an act or omission giving rise to a remedy by action for damages which is not an action of contract, e.g. trespass (q.v.), slander, libel, detinue (q.v.), negligence and nuisance (q.v.), and assault. A T. has some of the characteristics of a criminal offence, but is to be distinguished therefrom, though many crimes necessarily include a T. (e.g. a public nuisance causing special damage to an individual; rape), but every T. does not amount to a crime (e.g. slander and seduction are merely Ts), nor does every crime amount to a T. (e.g. blasphemy and treason). Where the T. is punishable summarily and the magistrates dismiss the case, no further proceedings, criminal or civil, can be taken. A cause of action in contract may co-exist with a T., i.e. the same facts may give A a remedy in contract against B and also a remedy in T. against C, e.g. where A is injured in alighting on a defective platform, belonging to B railway company, from a train belonging to C railway company which enjoys running powers over B's line (Pollock *On Torts*); conversely there may be two causes of action, one in T. and one in contract with a common defendant; and generally, when a contract inevitably gives rise to duties independently of the contract itself, the breach of them often amounts to a T., e.g. where A purchases goods on credit from B, and B resells before A makes default in payment, A can sue B for conversion.

Tortoise, a name for all the land Chelonians, and often applied to all members of the order Chelonians with the exception of the marine Chelonians or turtles. All members of the order are cold blooded, four footed, reptiles, without teeth, and are protected by a shell, or leathery case. All lay eggs, but otherwise there is wide diversity in their habits. They are of great geological age, and their tenacity of life has enabled them to survive where more recent animals of higher types have become extinct. The most familiar example of the land Ts. (*Testudines*) is the common or Greek T. (*Testudo graeca*) which occurs around the Mediterranean, and is much kept as a pet. It is entirely vegetarian in its diet, though frequently sold as an insect killer. Another T. which is sometimes offered for sale is the river T. (*Emys europaea*); this is a type of the river and marsh Ts. (*Emydes*) and is distinguished by its small yellow spots;

this eats insects, worms, etc. Among the mud or soft Ts. (*Trionycides*) are various American and Indian species which are frequently killed for food, the flesh being well flavoured. The most important of the turtles (*Cheloniades*) are the edible green turtle (*Chelonia midas*) and the hawksbill turtle (*C. squamata*), from which tortoiseshell is derived.

Tortoise Plant, see TESTUDINARIA.

Tortoise-shell, in commerce, is the horny plates of the hawksbill turtle (*Chelonia imbreicata*). Great cruelty has been exercised in removing the plates from living turtles, but the finest T. is derived from shells immersed in boiling water immediately after the death of the animal. Numerous imitations and substitutes are made.

Tortola, see VIRGIN ISLANDS.

Tortona, a tn. in Piedmont, Italy, 13 m. E.S.E. of Alessandria, on the Scrivia. Pop. (est.) 17,500.

Tortosa, a fortified tn. of Spain, in Catalonia, on the Ebro, 96 m. S.E. of Zaragoza. It is a bishop's see, with a fine Gothic cathedral, dating from the 14th century. It has trade in majolica, paper, soap, and leather. Pop. 25,000.

Torture. The application of bodily pain in order to extort evidence from witnesses or confessions from accused persons has been a feature of almost every judicial system of the world. In England the practice was virtually abolished in 1640. T. was abolished in France at the Revolution (1789); in Scotland by an Act passed in 1709. It was unknown in the German municipalities until the end of the 14th century, but once introduced it remained lawful (though only intermittently resorted to after 1750) in Hanover, Bavaria and some of the smaller German states until the first decade of the 19th century, while in Austria, Prussia, and Saxony it virtually ceased in 1750, and in Russia was finally abolished in 1801. The customary modes of T. were the rack, wheel, and thumb-screw, although in England in earlier times it was inflicted by the boot, by fire or water and by *peine forte et dure*, i.e. by piling weights on the prostrate body of the victim.

Toru, Dutt, see DUTT, TORU, or TARULATA.

Torula, see YEAST.

Tory, a synonym, though historically inappropriate, for a Conservative. The word T. is Irish, and signified, during the time of the wars in Ireland in the reign of Elizabeth, a kind of robber who, being attached to neither army, preyed generally upon the country without distinction of English or Spaniard. They were especially

prominent in the Protestant massacres of 1841. From this the term became applied to a body of men who, in 1680, appear to have ridiculed the Popish Plot and yet encouraged the Papists to revive it. Their political object was to banish the Duke of Monmouth and recall the Duke of York, and to further their end they endeavoured to thwart the Bill of Exclusion (from their abhorrence to which they were called 'abhorrrers' and their opponents the 'petitioners'). Ultimately the 'abhorrrers' and 'petitioners' became identified with the terms Tories and Whigs respectively. See *Edinburgh Review*, vol. i., 1830.

Tory Island, off the N.W. coast of co. Donegal, Ireland. Has a light-house.

Tossia, a tn. of Turkey-in-Asia, 97 m. N.N.E. of Angora. It manufs. Angora goat-hair and woollen stuffs. Pop. 10,000.

Tostig (d. 1066), Earl of Northumbria, was the son of Earl Godwin. In 1065 he was banished from his realm because of his cruel, repressive measures. The following year he returned with Hardrada, King of Norway, and was slain at Stamford Bridge by King Harold.

Totana, a tn. in the prov. of Murcia, E. Spain. Chief industries, flax-weaving and the manuf. of leather and pottery. Pop. 14,000.

Totemism is a belief prevailing among primitive peoples of bloodkinship with or descent from an animal or plant. The word is derived from the Algonquian Indian *otem*, a totem or guardian spirit, or rather from that form of it, *totem*, which signifies 'my *otem*' or guardian spirit (pronounced *odaim* and *todaim*). The argument of the late Mr. Andrew Lang that totemic or symbolic names, as 'the Snake' or 'the Wolf,' were given by rival and neighbouring tribes to communities which adopted these nicknames, is highly ingenious, but not altogether satisfactory. Certain savage peoples regard the points of the compass as being under the dominion of various animal eponyms, which in reality are minor deities, and it is not impossible that this might in some measure account for T. Still it would not account for plant totems. T. is at the root of nearly every mythology, and accounts for such mythologic phenomena as the animal-headed gods of Egypt, which were merely anthropomorphic totems in a state of high evolution. The system was certainly in vogue among the ancient Britons, Hebrews, Greeks, and many other European and Asiatic peoples, and still is so among, notably, the N.

American Indians and Australian aborigines. In several Indian 'nations' each individual of a tribe possesses a personal totem which he receives in a dream induced by drugs or hunger at the age of puberty. The idea of blood-kinship among the members of a totem tribe renders it incestuous for its members to intermarry, so that they are compelled to find spouses from another community. Hence also it is 'wrong' to kill a blood-brother, so the origin of the idea of sin may be seen imbedded in the totemic system. Family crests are regarded as of totemic origin. Indeed the results and vestiges of the system may be remarked as still existent among our modern institutions. Consult Dr. J. G. Frazer, *Fortnightly Review*, lxxviii.; Lang, *Secret of the Totem*; Spencer and Gillen, *Northern Tribes of Central Australia*; Gomme, *Folklore as an Historical Science*.

Totila (d. 552), King of the Ostrogoths in Italy, was proclaimed in 541. He at once commenced the restoration of the kingdom of Italy and gained a victory over the Romans near Faenza. Continuing his victorious march towards Rome, he formed the siege of that city in 546, which he captured the same year. In 547 Belisarius recovered possession of Rome and repulsed three assaults of T., who did not succeed in again taking the city till 549. Owing to T.'s continued successes the Emperor Justinian sent a large army against him, led by the eunuch Narses, in which the Romans were successful, T. dying from his wounds a few days after.

Totnes (the *Toleneis* of Saxon times), an ancient market tn., with cider breweries, on the Dart, 8 m. W.S.W. of Torquay, in Devonshire, England. Pop. (1911) 4128.

Tott, François Baron de (1733-93), a French officer, born at Champligny. He was for a time employed in the French embassy at Constantinople, and in 1767 became consul at the Crimea. Later, he returned to Constantinople, and effected various important military reforms there. He emigrated from France in 1790.

Tottenham, an urban district of Middlesex, 6½ m. N.N.E. of London Bridge, forming part of Greater London. The area is 3014 acres, and the pop. (1911) 137,418.

Toucan, a constellation formed by Bayer (c. 1603) near Phoenix in the S. hemisphere. a Toucan, 2.9 magnitude, is a solar star, δ and κ are double stars. It contains a globular cluster visible to the naked eye.

Toucans (*Rhamphastos*), a genus of birds, natives of tropical America,

characterised by their enormous bill and by their habit of bringing up their food after being swallowed to masticate. In confinement, which they bear well, they are almost omnivorous, but in a wild state they probably live chiefly on fruit. The plumage is brilliantly coloured.

Touch, the sense by which contact with the skin is experienced. Physiologically *T.* depends upon the stimulation of the *tactile corpuscles*, nerve endings which are contained in the papillae of the dermis or under-skin. The stimulus is conveyed by the sensory nerves to the brain and gives rise to the sensation of *T.* The number of tactile corpuscles varies in different parts of the body-surface, so that some parts are more sensitive to *T.* than others.

Touchstone, see **FLINTY SLATE**.

Touchwood, a soft white tinder-like substance into which wood is changed by the action of *Polyporus igniarius* and other fungi.

Tougourt, or **Tugurt**, a tn. and cap. of the Wad Rhir dist., Algeria, 228 m. from Constantine. Has an altitude of 200 ft., and is a town of considerable commercial importance. Pop. 2000.

Toul, a strongly fortified tn. of France, in the dept. of Meurthe-et-Moselle, is seated on the Moselle, in a plain almost surrounded by mountains. It is 34 m. W.S.W. of Metz. Its fine old cathedral (now the church of St. Etienne) was begun about 965 and took five centuries to build. It has trade in wine, brandy, lace, and embroidery. It capitulated to the Germans during the Franco-German War of 1870. Pop. 13,600.

Toulon (Toulon-sur-mer), ancient *Telo Martius*, a naval and military port and first-class fortress of Var dept., France, on a bay of the Mediterranean, 40 m. E.S.E. of Marseilles. Next to Brest in Finistère it is the chief naval station and arsenal of France. The commercial port and town are on the N.E. side of the inner harbour. *T.* contains a mediæval cathedral, a torpedo station, a naval hospital and schools, extensive docks and arsenal, the Musée Bibliothèque, and a convict prison, among other public buildings. Trade is not very important, but some wine, brandy, oil, and fruits are exported. Since 1912 *T.* has replaced Marseilles as the port of call for the Orient Steam Navigation Co.'s steamers to Egypt, Colombo, and Australia. Its original dockyards and arsenal were begun by Vauban in the 17th century, but destroyed by the British, to whom *T.* was yielded (Aug. 1793), being retaken by the French republicans (Dec. 1793). Napoleon first won

military fame during this memorable siege. The French battleship *Liberté* caught fire and was blown up in *T.* harbour (1911), and as a result many ships near by were damaged and about 200 people perished. Pop. (1911) 104,582.

Toulouse, the cap. of the dept. of Haute-Garonne, France, lies on the Garonne, 160 m. S.E. of Bordeaux. The river is spanned by the beautiful Pont-Neuf (1543-1626), which connects the city with St. Cyprien, its suburb. The Canal du Midi makes broad curves on the N. and E. The church of St. Sernin is a splendid Roman basilica. The cathedral, a structure of many periods, contains the tombs of the counts of *T.* Noteworthy also are the historic capitol, the 13th-century brick church of the Jacobins, the Hôtel Bernuy, and the Musée with its unique collection of antiquities. The city is also an archbishopric and the seat of a university. Besides a brisk commerce in corn, wine, and horses, all kinds of commodities, from steam engines to truffle pies, are manufactured. The national tobacco factory is here. In Roman times the town was called Tolosa, and it was ruled by counts from 778 to 1271. The execution of the innocent Calas (1762) stains the record of its parliament. Pop. 149,576.

Toulouse-Lautrec, Henri de (1864-92), a French artist, he studied art in Paris, where he imbibed the influence of Degas. There is a pastel of his in the Pinakothek, Munich: while a monograph on his art has been written by a German critic, Julius Meier-Graefe.

Tour, Maurice Quentin de la (1704-88), a French artist, born at St. Quentin, he lived chiefly in Paris, where he did crayon portraits of many of the celebrities of his day, but he retired to his native town ere his death. See Maurice Tournoux, *De la Tour* (Paris, n.d.).

Touraco (*Corythæix*), a genus of beautiful African birds with an erectile crest and green and purple plumage.

Touraine, a prov. of ancient France, corresponding in the main to the modern prov. of Indre-et-Loire. Its capital was Tours, and it was named from the Gallaic tribe of the Turones, who settled here. See A. Macdonell's *Touraine and its Story*.

Tourane, or **Turan** (Chinese *Shohan*), a port in Annam, French Indo-China, 54 m. E.S.E. of Hué. Coal is mined at Nongson near by. Pop. 5000.

Tourcoing, a tn. busily engaged like Roubaix, its southern neighbour, in the woollen and cotton industries, 8 m. N.N.E. of Lillo, in the dept. of Nord, France. Pop. 82,644.

Tourgenieff, see TURGENIEV, IVAN SERGIEVITCH.

Touriaville, a tn. in the dept. of Manche, France, 3 m. E. of Cherbourg, with iron and copper foundries. Pop. (est.) 7500.

Tourmaline, a mineral of variable composition, containing silica, aluminium, sodium, iron, magnesium, boron etc. It crystallises in the hexagonal system, and has a rhombohedral cleavage. It also occurs massive and compact and in radiate fibrous masses. In colour it is generally black, more rarely green, blue and red, and, still more rarely, colourless. The black variety is termed *schorl* (q.v.) and is brittle.

and is sometimes cut as a gem. Varieties of T. are rubellite (red or pink), indicolite (indigo blue), Brazilian sapphire (Berlin blue and transparent), Brazilian emerald (green), and peridot of Ceylon (yellow). T. occurs in granite, gneiss, mica, and chlorite slates and granular limestones; it is found in Cornwall and Devon, Bavaria and Switzerland. Thorubellite variety, used as gems, is found in Ceylon, Siberia, and Ava. The clear transparent varieties are used for making polariscopes, e.g. the 'tourmaline pincette.' See SCHORL ROCK.

Tourmente is a snow storm which descends without warning on the Alps much in the same way as the 'temporale' on the Andes. It is naturally a source of danger to herdsmen and chamois hunters.

Tournai (Flemish *Doornik*), a city with a noble Romanesque and Gothic cathedral and the tomb of Childeric, on the Scheldt, 11 m. E.S.E. of Roubaix, in Hainault, Belgium. So-called Brussels carpets are manufactured. Pop. 37,108.

Tournament, Tourney, or Joust, a form of martial sport very popular in the middle ages. Combats took place on horseback between men of noble rank, and a prize was given by the lady of the T. to the knight who had displayed the greatest prowess. The invention of this particular form of military display was ascribed by Ruesner to Henry the Fowler (d. 936) and by others to Geoffroi de Preulli (d. 1066). The custom was introduced into England from France during the 11th century. Ts. were regulated by definite rules and by very strict etiquette. The weapons used—spears, lances, swords, or daggers—had to be blunted. Each joust was attended by his squire, who acted as his second and could alone touch him if he fell. In spite of precautions, however, accidents and rough dealings were not infrequent. In England the T.

developed about the 15th century into a military pageant, and finally was ousted by the masque.

Tournefort, Joseph Pitton de (1656-1708), a celebrated French botanist. In 1683 he was appointed assistant professor with Fagon at the Jardin du Roi. In 1688 he was commissioned to travel through Spain and Portugal, and shortly after through Holland and England, in order to enrich the Jardin du Roi with the plants of those countries. Being made (in 1692) a member of the Académie des Sciences, he published *Elémens de Botanique*. The system of T. was an advance on those of Casalpino, Ray, and Rivinus, but has since been displaced by those of Jussieu and others. Authors had previously only grouped plants into classes; T. subdivided them into genera.

Tourneur, Cyril (1575-1626), an English dramatist, fought in the Low Countries, and died in Ireland after returning from Ceoll's sorrowful expedition to Cadiz. Those competent to judge criticise his *Atheist's Tragedy* as sublime in style, but quite immature in plot, whereas they deem no praise too extravagant for the deeply passionate and satiric *Revenge's Tragedy*.

Tourniquet, an instrument for preventing hæmorrhage by compressing the main artery of a limb. The usual form consists of two metallic plates, united by a thumb-screw, and a strap provided with a pad. The instrument is applied so that the pad is opposite the artery to be compressed, while the strap encircles the limb. By turning the thumb-screw the two metallic plates are gradually separated, so that the strap is drawn more tightly round the limb. A simple form of tourniquet for first-aid purposes may be contrived by tying a triangular bandage about the part, introducing a stick between limb and bandage, and twisting until the required degree of compression is obtained.

Tours, the cap. of the dept. of Indre-et-Loire, France, 146 m. S.W. of Paris by rail. There are printing works, and silk, stained glass, sweet besides. no and no archbishop, and boasts an historic cathedral, in which the gradual progress of architecture from 1170 till 1547 may be traced. The *Caesardunum* and later the *Civitas Turonorum* of the Romans, the scene of the ministrations of St. Martin and St. Gregory (q.v.), the capital of Touraine, and the birthplace of Balzac, it is full of old-time memories. Pop. 73,398.

Tourville, Anne Hilarion de Cotentin,

Count de (1642-1701), a French admiral and marshal of France, distinguished himself in the battle of Palermo against the combined fleets of the Dutch and Spaniards (1676). But his most famous victory was won in 1690 off Beachy Head against the Dutch and English. The enemy, however, retrieved this disaster in 1692, when T. suffered a calamitous defeat at La Hogue.

Toussaint, L'Ouverture (1743-1803), a liberator of Haiti, was a negro and by birth a slave. In 1791 he joined the negro rebels, and had soon, by his bravery and talents, established a wide sphere of influence. Joining the French when they abolished slavery, he was in 1796 given control of the forces in San Domingo, and with them restored peace in the land. But when Napoleon tried to recover the slaves to their bondage, he took up

2.

part of flax or hemp separated from the finer part by the hatchel or swinglo.

Tower Bridge, The, spans the Thames, London, connecting Bermondsey with the Minories. It was built between 1886 and 1894. Two slender iron bridges (200 ft.), the lower a carriage way, which lifts for the passage of large vessels, terminate at either bank in a tall Gothic tower (246 ft. high).

Tower Hamlets, a parl. bor. of E. London. The divisions are Bow and Bromley, Limehouse, Mile End, Poplar, St. George, Stepney, and Whitechapel. Pop. (1911) 442,202.

Tower of London, an ancient stronghold on the R. Thames in the City of London, England. Underneath have been found traces of Roman fortifications. The keep, or White Tower, was begun in 1078 under the direction of Gundulf, Bishop of Rochester, and all the other historic towers including Wakefield Tower, where the Crown jewels are kept, Beauchamp Tower, the place of confinement for so many unhappy and illustrious prisoners, and the Bloody Tower, where the Duke of Clarence and Edward IV.'s sons were murdered, are all of later date. The Tower is still a fortress, and contains barraeks within its precincts. It was a palace until Stuart times, when royalty came to see the lions (which were part of the menagerie) fight dogs and bears. But it is most notorious as a prison to which Sir Thomas More, Cranmer, Anne Boleyn, Katherine Howard, Lady Jane Grey, Sir Walter Raleigh, Sidney, and Russell were conveyed through the ominous Traitor's Gate. Consult Gower's *Tower of London*.

Town Council, the governing body

of a municipal borough or county borough (*see* BOROUGH). Where the particular town is included in the county area the county council has overriding administrative powers in certain matters; but in the case of county boroughs, the T. C. is practically independent of all other local governing authorities (*see* LOCAL GOVERNMENT). The T. C. consists of the mayor (*q.v.*), aldermen, and councillors. Membership of the council is restricted to persons enrolled, or entitled to be enrolled, as burgesses (*q.v.*). The councillors are elected for a period of three years, and one-third retire annually on Nov. 18 in each year and are eligible for re-election. Aldermen hold office for six years, one half retiring on Nov. 9 triennially. The mayor is the civic head of the borough, and presides over the T. C., and is entitled to the courtesy title of 'worshipful,' and may be paid a salary. The mayors of Manchester, Liverpool, Birmingham, Bristol, York, and a few other large cities or towns are Lord Mayors by letters patent. T. Cs. usually meet fortnightly or monthly, but they are only compelled to meet once a quarter.

Towneley, Charles (1737-1805), an English art collector, who gathered together a splendid collection of sculptures, bronzes, and coins, etc., which the British Museum purchased after his death for the Græco-Roman rooms.

Towneley Plays, The, or Wakefield Mysteries, are thirty-two in number, and are believed to have been written in the 15th century by the friars of Widkirk or Nostel. Like the York plays, etc., the various 'pageants' together dealt with the whole Bible story. Some, like those of Noah and the shepherds, are purely comic, and the whole are remarkable for their humour and animation no less than for their coarse tone.

Town Planning. The general aim of T. P. and its connection with the narrower subject of the housing of the working classes has already been dealt with in the article HOUSING OF THE WORKING CLASSES. Housing in the technical legal sense is a merely destructive policy mainly carried out by the machinery of closing and demolition orders; but T. P. is a constructive policy which aims at the *beau idéal* of towns whose every street and building shall be so constructed and correlated as to produce an hygienic, and even artistic, whole. Industry and poverty have, in practically every town in England, and indeed elsewhere, conspired to an common result of hideous and squalid ugliness, redeemed only by a few exceptional instances of private

munificence or enterprise. Whether this state of things is likely to be remedied in a thorough-going manner must depend on three things: Firstly, the degree of inclination on the part of local authorities, private landowners, and industrial capitalists to co-operate in the matter of land development; secondly, the extent to which these concerned can be persuaded of the economic soundness of even the minimum demands of T. P.; and thirdly, the education of the lower classes to appreciate order and cleanliness.

It is impossible within the limits of this article to explain in detail the direction in which economies may be effected by T. P., but some realisation of the truth of the principle that loss or injury to one member of the body politic results in loss or injury to all, may not only convince landowners, house-builders, rent-payers and rate-payers that T. P. is a good 'business proposition,' but may also serve to suggest how economy in land or town development along T. P. lines may be effected. No doubt it is impossible under the present system—unmethodical use of land, a building bye-law code which favours the operations of the jerry builder and speculator, and an artificially high cost of estate development—to re-organise our existing towns or town-extensions. The compensation of vested interests would in all probability entail a public burden which would more than counterbalance the net advantages of rebuilding; but at least it is possible by scientific T. P. methods to prevent the *continuance* of waste. The basic principle of T. P. is to map out beforehand all the constituent parts of a modern town, and then to arrange them in such a way that the whole shall exhibit a uniform and ordered harmony. An ideal T. P. scheme 'contemplates and provides for the development, as a whole, of every urban, suburban, and rural area likely to be built upon during the next thirty or fifty years' (Mr. Nettlesford, *Practical Housing*). 'The future town,' says the same authority, 'is divided into districts, and these districts are graded. High buildings close to each other are allowed in the centre and on the main arteries; in residential districts buildings must be lower and more dispersed, the further they are from the centre of the city or its main arteries. In these streets where traffic is light, and a sufficient distance is maintained between the opposite lines of houses, narrow and inexpensive roadways or drives are allowed in order to keep down the cost of estate development, which in modern English districts is responsible

for at least 1s. per week on a 6s. 6d. house.' Again, parks and open spaces and playgrounds are provided beforehand instead of waiting till the land required has risen to an exorbitant price; and these 'lungs' are planned on 'back-land' and not on valuable frontage, while to factories are allocated districts on the opposite side of the town to that from which the prevailing winds come, and with analogous considerations of amenity, convenience, and public health; all other classes of buildings are assigned the most suitable relative positions. There is no doubt of the importance of securing the sanction of the local authority to the construction of cheaper roads in purely residential districts, and indeed wherever heavy traffic is not likely to pass, and with that object in view, among others the Act of 1909 (section 55), allows, so far as may be necessary, the suspension of existing bye-laws. Unless facilities for reduction of road cost are given, it seems obvious that landowners will be justified in crowding as many as fifty-six houses to the acre in order to make building operations pay. In illustration of this, it is often pointed out that house rents might have been much lower in Bournville, Mr. Cadbury's model village, had the local authority not insisted on macadamised roads where they were not necessary. One of the best examples of T. P. in the world is Cologne, which city serves as the model on which many other German cities have acted and are acting. Under the 'zone' or 'district' building system the whole city area of Cologne is mapped out in zones, for each of which special building regulations are made, which for the most part allow of the different advantages detailed above. Some of the best English examples of T. P. are Port Sunlight, Mr. Reekitt's garden suburb on the outskirts of Hull, Earswick, Letchworth or the Garden City, Sutton (Surrey), Hampstead, Sherborne Tenants, and Fallings Park. Not one of these fulfils all the ideals of the town-planner; in many cases the rents are too high, and some of the old evils consequent on a 'cast-iron' bye-law system still tend to arise. Further, most of these schemes are merely praiseworthy efforts of private companies or a few individuals who have moved out with the co-operation of, but in spite of, local authorities. The objections to T. P. as summarised from Mr. Nettlesford's *Practical Housing* are:—(1) That it is too late to do much good. (2) That T. P. interferes with the

liberty of the subject, to which the enthusiast retaliates by pointing to the infraction of the liberties of landowners, honest builders, and the poor entailed by the present bye-law system. (3) That land speculation and jerry building will be stopped—an objection that carries with it its own answer. (5) That it tends to increase the price of land available for building purposes—the answer to which objection may be gathered from the observations on the reduction of the cost of estate development above. (6) That the give-and-take policy inherent in a system of released and suspended bye-laws will lead to corruption, which according to Mr. Nettlefold may be checked by refusing to grant concessions without receiving concessions in return, e.g. in the matter of the number of houses per acre. (7) That as in Germany T. P. may result in the erection of huge block tenement buildings on the land immediately adjoining town-planned districts—an objection which is answered by the explanation that this evil in Germany was the result of rapid and unforeseen developments after the war of 1870. Again, there are the following objections by those who prefer alternative methods of housing reform to T. P. (8) That improved means of communication and the taxation of land values will solve the housing problem without other assistance; and (9) that the only way to secure a supply of good cheap houses is to introduce the principle of municipal house-building (see MUNICIPAL TRADING). Part II. of the Housing and Town Planning Act of 1909, which is headed Town Planning, contains nothing in the shape of a definition of T. P., and there is but little detail in its very tentative provisions, and much that seems essential to even the most modified ideal is relegated to schedules and the regulations of the Local Government Board made in pursuance of the Act. If the movement for T. P. becomes successful there can be no doubt but that a separate Act will be passed in the near future embodying the experience of the past. In 1912 the urban district councils of Acton, Barnes, Beckenham, Cleeve, Greenford, Hayes, Coombe, Merton, Sedgley, Southall-Norwood, Surbiton, Walthamstow, and Warrington, and the corporations of Blackburn, Halifax, Kingston-on-Hull, Middlesbrough, Portsmouth, Southport, and Stockport, and the rural district councils of Croydon and Grimsby, had all proceeded far enough to encourage the belief that they had definitely pledged themselves to proceed with schemes. It is a lamentable feature of the Act

of 1909 that so much power has been vested in the central authority—the Local Government Board, and that local authorities must necessarily be fettered at every turn by a veritable jungle of statutory regulations. If local authorities and landowners do not choose to co-operate in the T. P. movement it seems unlikely that any direction by the Board to a local authority on the representation of inhabitants will be really effective. It is submitted, too, that some of the Board's subsequent regulations are *ultra vires*. These criticisms will be found fully elaborated by the present writer and Mr. Casson in Casson and Ridgway's *Housing and Town Planning Act, 1909*.

Townshend, Charles, second Viscount (1674-1738), a statesman, took an active part in supporting the Hanoverian succession, and on the succession of George I. was appointed Secretary of State for the Northern Department. He lost favour with the king in 1716, and was sent to Ireland in 1717, but was soon dismissed. In 1720 he was President of the Council under Stanhope, and on Stanhope's death (1721) became again Secretary of State, which office he held until 1730.

Townshend, Charles (1725-67), a statesman, entered parliament in 1747. He held the office of a Lord of the Admiralty for a short time in 1754-55, and was Secretary-at-War, 1761-63, and then went to the Board of Trade. He became Paymaster of the Forces in 1765, and in 1766, under Chatlam, Chancellor of the Exchequer. He was a firm advocate of the Stamp Act, which lost the American colonies to England. He was an admirable orator, and the subject of one of Burke's most magnificent panegyrics. There is a biography, entitled *Charles Townshend, Wit and Statesman*, by Percy Fitzgerald, 1866.

Township, or Vill, originally a group of allodial (see TENURE) proprietors united by community of agricultural interests, the chief officer of which was the town-reeve. Later the T. consisted of the tenants of some one great overlord vested with powers of local government under the supreme control of the overlord who himself nominated the reeve. Under the Norman kings the T. became a manor and formed the nucleus of the mediæval borough. Each manor contained the demesne lands of the lord, a number of freehold tenements, villein tennres and waste land for pasture. The term is not now in common use, but until recently meant legally a town containing more than one parishioner.

Townsville, a port and episcopal

see of Queensland, Australia, is situated on the E. coast. It is the seat of an Anglican bishop, and possesses a cathedral. It has various manufs. Pop. 13,678.

Towson, John Thomas (1804-81), an English scientist and author, first suggested the use of a reflecting camera, and showed how to take photographs on glass. In navigation he demonstrated that great circle sailing was the shortest, and also wrote a treatise on the deviation of the compass in iron ships.

Towton, a par. in the W. Riding of Yorkshire, England, 2½ m. S. of Todcaster, and the scene of the Yorkist victory of 1461.

Towy, a river, rising in N.E. of Wales and flowing 35 m.

the chemical nature of poisons, their origin and preparation; their physiological action and the tests by means of which their presence may be detected; the pathological changes due to their presence and the recognition of them by post-mortem evidences; their chemical reactions with a view to the preparation of an antidote and the he latter.

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the poisons excreted by bacteria and those which are antidotes, either in a chemical sense or as poisons for the bacteria. This subject views the matter as warfare between germs and the cells of living creatures, carried on largely by means of excreted poisons. The investigation tends to assume the form of research into the molecular structure of the chemical concern. See POISONS.

Toxophilite Society, Royal, was founded by Sir Ashton Lever in 1781 in order to revive the sport of archery in England. It has its shooting-ground in Regent's Park, London.

Toyama, a tn. of Hondo, Japan, 160 m. W.N.W. of Tokio, and an important trade centro. Pop. 57,437.

Toynbee, Arnold (1852-83), an English economist and social reformer, born in London. He was intended

Canon Barnett. He died of overstrain. See Monographs by F. C. Montague (1889) and Milner (1901).

Toynbee Hall, Whitechapel, was founded in 1884 by Canon Barnett and a group of friends, who named it in memory of Arnold Toynbee. It was the first of many settlements for improving the social conditions of the East End. It contains rooms for some twenty resident workers.

Toyokuni (1769-1825), a Japanese artist. He won great fame by his coloured woodcuts; and on his death a number of his finest prints were buried along with him by some of his pupils, this strange act being regarded in Japan as a mark of exceptional homage. Concerning himself mainly with portraying actors on the stage, T. had a genius for reincarnating a momentary gesture, and in general he did this with a rare economy of line which makes his feat additionally striking.

Toys, implying in a general sense, children's playthings. T. can be traced back to very remote periods. The top is mentioned by Virgil in the seventh *Æneid*, and was probably introduced into England by the Romans. The Greeks appear to have played with four different kinds of ball: the little ball, the great ball, and the empty ball, which was blown out like the modern football. There is a collection of very early Roman s in the Musée du Louvre, Paris, which a description is given in that interesting work of H. R. d'Alton-magno's *Histoire des Jouets* (Paris, 1903), and which deals very fully with les poupées of different periods.

T. P.'s Weekly, a weekly paper founded in 1902 by Mr. T. P. O'Connor, M.P. It contains able reviews in the personal as opposed to the editorial style; stories, historical sketches of celebrated personages or events; anecdotes, literary discussion, etc.

Tracadie, a fishing vil. on the Gulf of St. Lawrence, 35 m. E. of Bathurst, New Brunswick, Canada. It contains a leper hospital. Pop. 2000.

Trachea, or Windpipe, the air tube which leads from the larynx to the bronchi. It is about 4½ in. long, and is made up of fibro-elastic membrane encl ½ in. or con-tissue trachea

front of the oesophagus creates into the two e trachea is sometimes inflammation through the foreign bodies. In such removal of the body is with a fair amount of risk, e danger of respiratory ob-

He also did much for the betterment of industr-tions. In 1875 he went chapel, where he joined in

struction is usually greater if the condition be allowed to persist. removal should be attempted with every preparation being made for the operation of tracheotomy.

Tracheotomy consists of cutting into the windpipe above or below the isthmus of the thyroid gland. A curved tubel inserted into the orifice, and by this means breathing is carried on. The operation is called for when the upper respiratory passages are obstructed by foreign bodies or morbid growths, as in diphtheria.

Trachonitis, a district of ancient Palestine, corresponding to the modern Lejā. It lies S. of Damascus, E. of Aulanitis and N. of Batanea, in Bashan. In 37 A.D. Herod I., king of Judca, received the tetrarchy of Batanea and T. from Caligula.

Trachyte. The Ts. form the volcanic type of the s...

Characteristic and hornblend usually as sai

twinning). The Ts. are named after their most conspicuous mineral, thus: sanidine T., hornblende T., etc. The leucitophyres and phonolites are trachytic rocks containing leucite and nephelino respectively. Trachytic rocks are found in Cornwall, Haddington, Auvergne, and Hungary.

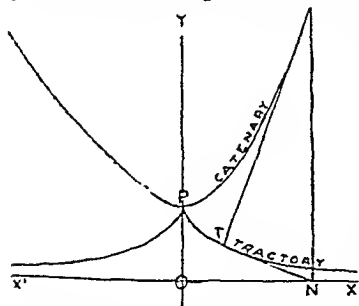
Tractarianism, a name once commonly given to the movement now better known as the Oxford or Catholic Movement, which arose about 1833 in the Church of England. It was so called because its propaganda was carried on largely through the series of *Tracts for the Times*, of which ninety were published. See OXFORD MOVEMENT, POSEY, etc.

Tractory, or Tractrix, the curve traced by a heavy particle dragged by an inelastic string attached to a

length. If a point P be taken on the curve, its co-ordinates being x, y , then the arc $AP = a \log_e a/y$, area = $a^2 \sin^{-1} y/a$. The curve is asymptotic to xx_1 , and a circle with radius equal to the tangent has an area equal to the total area included in the four branches of the curve symmetrically disposed to the axis.

Tract Societies, societies designed for the publishing and distribution of religious pamphlets and books, designed to reach the mass of the people. The Society for Promoting Christian Knowledge (q.r.) founded 1701, had this object, as had also the undenominational Society for Promoting Religious Knowledge among the Poor (1750). The greatest, however, of such societies is the Religious Tract Society, founded in 1799 by the Rev. George Burder, which has proved a useful auxiliary to the various missionary societies. Its publications appear in over 250 different languages.

Trade. From about 1607 England adopted a coherent if erroneous science of commerce—the celebrated doctrine of *The Balance of Trade*. In accordance with this doctrine it was assumed that an excess of exports over imports was 'the sole criterion by which the relative position of the country as to wealth, should be judged,' and it was further held that the excess of the value of imports over exports could be balanced in no other way than by the importation of an equal value in gold and silver (Webster, *The Trade of the World*). During the 13th century, England's foreign T. consisted mainly in wool, wine, herrings, and cloth. The ordinances of the staple were very naturally designed to maintain a high price for wool exported, and there was appointed thus early in our commercial history a body of customs collectors in all the ports. Wine was mainly imported, though some was home grown: the principal object of regulation, even fifty years earlier than Edward III., was that it should be obtained by consumers on the easiest terms possible, and hence the privileges accorded to the Gaseony merchants by Edward I. excited the hostility of the city of London merchants. At this period the middleman was anathema as well to the legislature as to the consumer; and ordinances were framed against 'forestalling' or 'engrossing.' But with the increasing complexity of commerce it was soon found to be impracticable to attempt to interfere with middlemen whether in the interests of the producer or the consumer. Perhaps the most striking institution in regard to T. in the middle ages was that of



point moving in a straight line. It is represented in the figure where its evolution, the catenary is also shown. Tangents intercepted between the curve and the x axis are of equal

the craft-gilds, an institution which did more than any other during these earlier times to co-ordinate and regulate T., not only in England, but on the continent—whence, indeed, the institution was imported (*see also* TRADE UNIONS). The principal effect of the gilds on T. was that by regulating apprenticeship and insisting on a high quality of manufacture, they, by their own material prosperity, not only reacted upon the growth of towns, but themselves became identified with the municipal or controlling authority, although in another direction they checked the expansion of T. by their exclusiveness. The geographical discoveries of the 15th century expanded the area of commerce, and the suppression of municipal or civic by national life gave rise to schemes for economic progress in various European countries. The importance of these schemes lies in the fact that they opened out the way to investment of capital, and by so doing introduced the only feasible antidote to the artificial restrictions on T. expansion imposed by the gilds. The principal events in the history of English T. in the reign of Elizabeth were: (1) the systematic development of English maritime power; (2) the immigration of skilled labour through Burleigh's grants of patents for new enterprises, and the consequent introduction of new industries by capitalists; (3) the establishment of plantations abroad notably in America; and (4) the introduction of banking and insurance. Another significant feature of the changing times was the fact that capital was sunk in land, so as to make it commercially profitable, whereas previously tillage was practised for subsistence, not for profit. The differentiation between employer and employed, notably in the spinning T. of the west of England, was the direct outcome of the fact that the capitalist employer was in a superior position to the wage-earning workman. The saving device of the profitable mercantile system under Walpole directly encouraged the introduction of non-indigenous Ts., but the domestic system offered but little in the way of a solution of the cardinal difficulty—the dearth of materials in the established manufactures. Capital everywhere promoted T. by finding the necessary materials, fostering skilled immigrant labour, and making a market. Perhaps the revolt and severance of the American colonies was the best conceivable antidote to the short-sightedness of the British commercial system,

for that system was fashioned solely in the interests of English industry, and conversely hampered and repressed colonial industries in every direction (*see on this* Cunningham, section xvii., subject, *Mercantile System*). Then came the industrial revolution in the shape of the introduction first in the textile and then in the other Ts. of machinery, and as a corollary, the rise of factories and the wage-earning class; and it is only in more recent years that the negative philosophy of this great capitalist system of T.—the doctrine of *laissez faire*—which came as a reaction from the protectionist principles of the early part of the 18th century, has been seriously called into question (*see on this* FACTORY AND WORKSHOPS ACTS; LIBERALISM). For British commercial policy during the last hundred years, *see under* FREE TRADE; PROTECTION; TARIFF; and TARIFF REFORM; and for the most recent statistics of British foreign trade, *see under* MERCANTILE MARINE.

Trade, Board of. This office was the lineal successor of the old Privy Council Committee of Trade and Plantations, which in its turn was the successor in 1695 of the two old councils of Trade and Foreign Plantations created by Charles II. in 1660. The committee or B. of T. and Plantations, according to Sir William Anson, was an inefficient body which became an expensive machine for making inquiries which were seldom made, and for having in readiness advice which was seldom asked for. It was dissolved in 1786 and replaced by a body on the basis of the present B. of T., the name 'B. of T.' not being given to the department till 1862. It is still theoretically a committee of the Privy Council. Its principal duties are: (1) To collect statistics of foreign, home, and colonial trade; (2) To settle and approve bylaws of railway companies, and generally to regulate railways and tramway companies; (3) To control in the interests of public safety all gas, electricity, and water companies; (4) to collect labour statistics and generally investigate the conditions of labour in the United Kingdom (*see also* LABOUR EXCHANGES); (5) to register joint stock companies; (6) to superintend the grant and registration of patents, trade marks, designs; (7) to maintain harbours and lighthouses; (8) to control merchant shipping (*see* MERCHANT SHIPPING); and (9) to investigate through official receivers, the conduct of bankrupt debtors.

Trade Corporation, see CORPORATION.

Trade Marks. The Trade Mark Act, 1905, defines a T. M. as 'a mark

used, or proposed to be used, upon or in connection with goods, for the purpose of indicating that they are the goods of the proprietor of such T. M. by virtue of manufacture, selection, certification, dealing with, or offering for sale 'and includes in the term 'mark' a device, brand, heading, label, ticket, name, signature, word, letter, numeral, or any combination thereof. A T. M. is not, like a design, a species of incorporeal property in which a man can obtain copyright, but its practical effect is the same as soon as it is applied to the goods he sells, for, assuming the mark to be distinctive, a rival trader could at once be restrained by injunction from applying a similar mark to his goods upon the broad ground that he would thereby be inducing purchasers to think that his goods were those of another person. In short, a T. M. denotes the producer of a thing, and not the thing produced, and in that respect differs from a 'trade name,' the object of which, being in reality an advertisement of the character and quality of the goods, may be attained by describing either maker or article or both. To be valid as a T. M., the mark chosen need not have any meaning, but whatever it is, it must be distinctive in the sense that it is adapted to distinguish the goods of the proprietor of the mark from those of other traders before it will be registered by the Registrar. (The Registrar's address is: The Registrar, Patent Office, Trade Marks Branch, 25 Southampton Buildings, London.) No mark will be registered unless it contains at least one of the following 'essential particulars': 1. The name of a company, individual, or firm represented in a special or particular manner (called 'name marks'). But one trader cannot by virtue of registration under the Act of 1905, obtain the right to prevent another trader honestly describing his own goods by his own name. 2. The signature of the applicant for registration or some predecessor in his business. It is highly inadvisable from a commercial point of view to adopt a signature T. M. Ordinary customers can hardly read or remember them, and, moreover, they afford little protection against traders with similar initials. 3. An invented word or words (called 'word marks'). These are very popular as T. M., for in the words of a high authority, 'While in many of the classes all, or almost all, the suitable devices are either already appropriated or have ceased to be distinctive, the number of new words which may be invented is practically unlimited' (Mr. Kerby). Under the old Trade Marks Act of

1883, word marks were defined as 'a fancy word or words not in common use,' and so severely was this definition construed that 'Gem' as applied to a gun was held not registerable. That Act still governs 'old marks' or T. M. registered at that date, but not new marks under the Act of 1905. 4. A word or words having no direct reference to the character or quality of the goods, and not being according to its ordinary signification a geographical name or surname. Under the analogous clause in the old Act, *Appollinaris* as applied to mineral waters, *Unceda* to biscuits, *Hæmatogen* to medicine were held to be such as had reference to character or quality. *Kynite* for explosives, *Trilby* for blouses, and *Mazawatlee* for tea were held to have no reference to character or quality and therefore to be within the protection of the clause. The whole object of the drafting of the clause in so guarded a manner is to prevent ordinary English words from being registered so as to deprive the public from employing them in their ordinary meaning. 5. Any other distinctive mark, but a name, signature, or word or words, other than such as fall within the descriptions in 1, 2, 3 and 4 (*supra*) shall not, except by order of the Board of Trade or the court, be deemed a distinctive mark. But any special or distinctive word, letters, etc., used as a T. M. by the applicant or his business-predecessors prior to Aug. 13, 1875, which has continued in use without substantial alteration down to the date of the application for registration will be registered under the Act of 1905 (*i.e.* irrespective of its failing to satisfy any of the 'essential particulars' above noted). T. M. must be affixed in some way to the articles sold and thus again differs from a 'trade name' (which must not be confused with a 'name mark'). In case of infringement, the injured party may choose between damages or having an account taken of profits. Registration is a condition precedent to the right to sue. In regard to *trade names* the law merely recognises a person's right to prevent others from personating his business by using any such description as would lead customers to confuse his goods with those of a trade rival.

Trade Protection Societies, Association of. This association was founded in 1848 for the purpose of protecting and developing the trade of the United Kingdom, furthering the interests of commerce by promoting bills in parliament or opposing such bills as might be injurious to trade, and

generally of assisting the commercial community. The affairs of the association are managed by an elective committee. Over 100 societies, representative of all branches of manufactures and trade, are affiliated to the association.

Traders' Defence Associations.—These associations, which exist both in England and Scotland, were founded with the object of defending the interests of private traders or companies against (1) governmental and municipal interference in the form of burdensome taxation, oppressive inspection, etc., and (2) the trading activities of co-operative societies; and of municipal bodies.

Tradescant, John (d. 1637), a naturalist, is most probably the author of *A vray of unbusid*, the earliest account extant of plants.

He took part in the expedition against the Algerine pirates (1620), and brought back the 'Algier apricot.' His son, *John Tradescant* (1608-82), made a collection of flowers, plants, and shells, which he bestowed on Elias Ashmole, who presented it to Oxford University (1682). He published *Museum Tradescantianum*, 1656. He introduced, with his father, the lilac, acacia, and coedidental plano.

Tradescantia, or Spider Wort, a genus of herbageous plants (order Commelinaceae), bearing cymes of red or blue flowers. They are frequently grown under glass.

Trade Unions. The object of T. U. is simply the substitution between employer and employee of collective action. A modern union of workmen

for the purpose of

ing particular industry. The secondary function of a T. U., and that by exclusive reference to which the jealousy of legal theory for years recognised its existence, is to act as a benefit club or assurance company. Every member is bound by the rules to contribute a fixed weekly sum to the funds, from which, in case of illness or loss of employment, he obtains assistance, or in the event of death his dependents are provided for.

T. U. have been so powerful in recent years, and the parliament of 1906 saw the election of some fifty members, nearly all of whom were purely T. U. representatives, that the exercise of political power, though it may be by the judgment (see below), has greatly added to the effectiveness of a strike—the chief weapon of a union's

armoury—a fact which was remarkably emphasised during the great railway and transport strikes of 1911, when the ministry found themselves forced to treat directly with the men's representatives.

Origin of trade unions.—Despite great controversy, there can be little doubt of the accuracy of Brantano's view that T. U. were the successors of the craft-gilds, and more especially of the English gilds. The latter were organs of free handcraftsmen, which existed for the purpose of protecting the members against the abuse of power on the part of the lords of towns, who endeavoured by imposts and otherwise to encroach on the freeman's earnings.

It is true that the craft-gilds had deteriorated into mere societies for the investment of capital, or became identified with the municipal authority of a borough; but it seems almost indisputably proved by Brantano that the T. U. originated with the non-observance by master manufacturers of the regulations of the Statute of Apprentices (5 Eliz. c. 4), which regulations, expressly designed to ensure 'good quality of work' by craftsmen, indirectly resulted in rendering the position of the latter eminently secure. Shortly, that statute forbade any one to practice either as master or journeyman any 'art, mystery, or manual occupation' unless he had been apprenticed therein for seven years; whoever had three apprentices must keep one journeyman, and for every other apprentice above three, one journeyman; the hours of work were fixed to about twelve in the day, and from dawn till night in the winter; and wages were to be assessed yearly by the justices of the peace, while same authorities were to settle all disputes between masters and apprentices, and to protect the latter from competition.

In the maintenance of a high degree of skill, while great stability and regularity of employment was assured to both apprentice and journeyman. Moreover, slackness of trade, at all events in the woollen industries, did not stop work in the workshops, for the masters did not work to order, but simply took their products to the central market for sale and waited for buyers; while in extreme cases, the masters took work from others during a bad period. In the 16th century it became customary to employ workers who had never served an apprenticeship, besides women and children (the latter at an earlier age

than would have been possible without machinery), at a much lower rate of wages than the men. This violation of old customs and laws soon brought distress on the weavers, and led them in 1796 to form a trade society, the 'Institution,' as it was called, among the Halifax cloth workers, the object of which was to prevent any one from carrying on the trade contrary to law and custom, and to assist sick members. The same evolution is observable in the case of the framework-knitters, the Spitalfields silk-weavers, the hatters, calico printers, and others, all of whom, at various times in the course of the 18th and 19th centuries, combined, as soon as attempts were made to break up the old order of things.

Trade unions and the legislature.—The rise of the mere capitalist-employer as distinct from the master-manufacturer had two results: (1) the definite estrangement of employer and workman; (2) the depression of wages all round as a consequence of over-production. The 'workers,' becoming mere automata; knowing nothing but a single process, where before they could produce the whole manufactured article; in constant danger of starvation through the introduction of labour-saving machinery, frequently gave themselves over to furious rioting. The more orderly elements combined, and by the lever of strikes endeavoured to obtain better terms of employment. The result of these combinations was the Combination Laws (*q.v.*), the one-sided nature of which was in no way palliated by the assumption that the underlying principle of rendering illegal any agreement in restraint of trade (*see* RESTRAINT OF TRADE) applied equally to combinations of masters as to those of men.

The repeal of the Combination Laws in 1824 left the 'workers' free to enter into T. U., and since that year unions have been formed in most of the great manufacturing towns, where the concentration of members has given them formidable influence and ample funds (*see* chap. xi. of Burnley's *Romance of Modern Industry*). The legalisation of T. U. *per se*, irrespective of their tendencies in restraint of trade, naturally led to abuses, Picketing, intimidation, and incendiarism, directed against both 'black-legs' and employers, were so frequently resorted to that parliament in 1875 passed the Conspiracy and Protection of Property Act, which punishes by fine or imprisonment (1) such acts as hiding tools, using violence to a man or his wife or children, besetting his house, and persistently following him about; and

(2) the wilful and malicious breach of contract of service so as to cause a failure of gas or water or danger to life. One concession was made to T. U. in this Act in the clause which allows that trade disputes shall form an exception to the general criminal law of conspiracy (*see* CONSPIRACY). This immunity from criminal responsibility, however, still left the unions liable to civil actions for damage done by their agents, whether in the shape of conspiratorial acts or otherwise, a responsibility fully exemplified in such *causes célèbres* as *Quinn v. Leatham*, *Allen v. Flood*, and the *Taff Vale* case, in which last case it was decided that the funds of a T. U. could be attached to answer damages awarded against the union. This state of the law led to the passing of the Trades Disputes Act, 1906, which in some four sections placed T. U. in a position of legal immunity which no other association of individuals has ever enjoyed before or since. The unique legal immunities gained by T. U. in 1906 were, however, largely counterbalanced by the set-back in political power involved in the decision in the case of *Osborne v. the Amalgamated Society of Railway Servants* (1908). In that case the court of appeal, overruling Mr. Justice Neville, held that a T. U. could neither allocate its funds to, nor make a levy for, political purposes, and that its lawful activities related exclusively to industrial matters. Since that decision the Labour Party, after repeated efforts, secured in 1913 the passing of an Act partially reversing the judgment. The Trade Unions (No. 2) Act provides that a T. U. may apply a portion of its funds to political purposes, on condition that the majority of the members approve thereof, and that the political and ordinary funds be kept separate, and that those unwilling to contribute to the political fund shall not be compelled to do so.

Economic effects of trade unionism.—It is beyond controversy that the machinery of a T. U. cannot increase the rate of wages by depressing the profits of capital, for it is an economic commonplace that such profits, *i.e.* the 'wages of abstinence' or 'interest on advances,' are in a manner a fixed quantity. The greater the insecurity of these profits, the higher will be the rate payable to the employer as compensation for the contingency of loss. Moreover, with but one exception, that of agricultural industries, the struggle is not between labour and capital, but between the labourer and the consumer; and it is clear that the latter, when prices rise as a result of the coercive action of T. U., will cut down his purchases to

the lowest possible limit of subsistence. In the excepted case of agriculture the loss accruing from a rise in wages would ultimately fall not on the farmers but on the landlords, who must necessarily decrease his rents. But even so agriculture need not be considered, because experience shows that the difficulty of combination among agricultural labourers, observable in the infancy of T. U., continues to the present day, and in any case the rapid improvements in agricultural machinery would have quickly nullified any effect an agricultural union might have had. Again, the effect of a successful combination to raise wages in those industries which manufacture goods capable of importation will not raise prices beyond the amount at which the importers can afford to sell, while as to goods which cannot be imported, it has been indicated above that a rise in price can be continued only so long as the consumer abstains from economising his purchases. The net effect of the interference of T. U. has probably been to augment prices without in any way decreasing the profits of employers. Furthermore, there is considerable justification for the assumption that T. U. are 'a machinery by which 10 per cent. of the working classes combine to rob the remaining 90 per cent.,' in the economic axiom that the wages fund is a certain quantity; while there is even greater force in the argument that a general rise in prices, unaccompanied by a corresponding rise in wages, hits the trade unionist as hard as any other

been a rise in prices unaccompanied by any increase in the cost of pro-

1912, is in no way inconsistent with the foregoing statements, inasmuch as the flexibility of wages is tacitly assumed by the omission in the Act of specific figures.

Trade union statistics.—At the end of 1912 there were over 1100 unions, with an aggregate membership of about 3,000,000. The number affiliated to the Trades Union Congress in 1913 was 2,232,446. The increase in membership for the decade 1900-10 was about 250,000. The large increase of

230,813 trades unionists represented at the Trades Union Congress in the year 1912-13 is attributable to the effect of the National Insurance Act, 1911. The hostility to female members is sufficiently indicated by the fact that the latter still number less than 10 per cent. of the whole, and even these are for the most part cotton or other textile operatives. The aggregate funds of all the principal unions increased from four to five millions sterling during the same period, but the heavy drain on their resources in 1911 has probably brought this total down by at least three-quarters of a million.

Amalgamation and syndicalism.—The outstanding feature of T. U. development in recent years is the movement towards amalgamation. Many unionists have begun to appreciate our reduces its that the most s not by par- whole industries. Up to now, however, the general body of unionists have, with a few striking exceptions, notably among the railwaymen, not favoured the proposals for amalgamation of different sections, proposals which, if adopted, might well be a first step in the direction of Mr. Belfort Bax's 'Ad- Reli- gion of Socialism, 1896). If, as is probable, such a fusion fell short of any such visionary ideal, it would certainly help the aims of Syndicalism (q.v.).

Trade union organisations.—The chief executive body of the trade unionist movement in England and Wales is the Parliamentary Committee of the Trades Union Congress. Scotland and Ireland have separate T. U. congresses. The Labour Party and the C Unions

world in the number of trade unionists, has recently yielded place to Germany, the chief national organisation for that country being the General Commission of the German T. U. formed in 1890. Herr Karl Legien, president of that body, is secretary of the secretariat of the International Trades Union Movement, to which nineteen countries with more than 7,000,000 trade unionists are affiliated. The national body of the U.S.A., the American

Federation of Labour, has about 2,000,000 members, and the French T. U. movement is represented by the smaller but active Confédération Générale du Travail.

Trade Winds, the currents of air on the earth's surface travelling from the high pressure belt of the tropics to the low pressure of the equatorial belt. Owing to the eastward rotation of the earth, they have a westward lag. In the N. hemisphere they are N.E., in the S. hemisphere S.E. winds. In March the positions are: N.E. (Atlantic) 3° - 26° N.; (Pacific) 5° - 26° N.; S.E. (Atlantic) 0° - 25° S.; (Pacific) 3° - 28° S. In September, N.E. (Atlantic) 11° - 35° N.; (Pacific) 10° - 30° N.; S.E. (Atlantic) 3° - 25° S.; (Pacific) 7° - 20° S. From March to July each belt swings northwards; from September to January southward. Lying in regions where rotational velocity increases only slightly towards the equator, and travelling from a restricted to more extended areas, they tend to curve westwards only slightly and are of a mild nature, with an absence of vortices or cyclones. Their steadiness of strength and direction led to the name trade (trend). The configuration of land and water leads to greater curvature and a general formation of great anticyclones, of which the trades form the equatorial half. Towards the W. of the oceans they become more westerly and impinge on the E. coasts of continents, giving satisfactory rainfall. At their origin they are dry, fresh, gentle breezes, but they gradually become damp and stronger, cumulus cloud of characteristic nature forming. The regions are marked by little rainfall and greater salinity over the ocean; the corresponding land regions tending to desert conditions. *Anti-trades* are the return currents from the equator travelling above the trade winds and towards the N.E. They are in part the source of the westerlies on the polar sides of the tropical calms; the term is sometimes erroneously applied to these surface winds. *Reversed trades* occur particularly in the Indian Ocean during the summer, when they form the S.W. monsoons. They succeed in 'dragging' the S.E. trades across the equator, the doldrums thus not occurring.

Traducianism, the theory that souls are propagated in a similar way to the procreation of the body. See Tertullian's treatise *De anima*.

Trafalgar, the name of a cape on the S. coast of Spain between Cadiz and Tarifa, and the scene of the great naval victory of the English fleet under Lord Nelson over the combined French and Spanish fleets under

Villeneuve on Oct. 21, 1805. This battle shattered the power of France and Spain at sea at a time when Napoleon had made himself master of Europe and protector of the Confederation of the Rhine. Nelson, after the close of the Danish War in 1801 and his unsuccessful attack on the preparations at Boulogne for the invasion of England, had retired to his estate at Merton, and apparently for good. But the short peace of Amiens was soon dissolved, and Nelson was called upon to resume the command of the Mediterranean fleet (1803). During the winter of 1804 he watched Toulon harbour, where the French were preparing to embark a large body of troops for some unknown destination. Nelson sailed for Barcelona to draw them out, and in his absence Villeneuve with ten ships-of-the-line and many frigates put to sea (Jan. 18, 1805). Nelson, believing Villeneuve to be going to Egypt, himself sailed for Sicily, but Villeneuve had passed the Straits of Gibraltar and effected a junction with the Spanish fleet at Cadiz. Nelson, on learning this, chased Villeneuve to the W. Indies, whence the French, in terror of his name, returned without accomplishing anything. Nelson returned in pursuit, but learning that the enemy had arrived at Cadiz, he returned to England, but immediately volunteered his services again, which, of course, were readily accepted, and joined Collingwood's squadron off Cadiz (Sept. 29). Early in October Nelson received information from which he concluded the enemy would soon put to sea, and having on Oct. 4 laid before his admirals and captains a simple mode of attack, he disposed his fleet in such a manner as to tempt the enemy to come out. The *Euryalus* frigate kept watch within half a mile of the harbour mouth; eight sail-of-the-line were kept at a still greater distance; Nelson, on the *Victory*, remained off Cape St. Mary with the rest of his fleet of twenty-seven sail-of-the-line and four frigates, the frigates extending in a line of communication between him and those seven or eight ships off or near Cadiz. The enemy put to sea on the 19th. The last order given by Nelson, who displayed on this occasion all his wonted animation and confidence, was the historic utterance: 'England expects every man this day to do his duty.' Perhaps the most remarkable phase of the battle itself was the desperate struggle between the *Victory* and *Temeraire* on the one side and the *Redoubtable* and the *Fougeux* on the other, the four ships forming 'as compact a tier as if they had been moored together.' It was a

shot from the cross-trees of the *Redoubtable* that killed Nelson, the musket-ball entering the epaulet on the left shoulder, passing through the spine, and lodging in the muscles of the back. The British loss was 450 killed and 1250 wounded. Nineteen of the enemy's fleet (which had comprised thirty-three sail-of-the-line and seven frigates) were captured and one blown up. The prisoners numbered 12,000. The result of the victory saved England from all chance of an invasion and paved the way for the ultimate success of the Anglo-Russian treaty to resist the encroachments of France and to secure the independence of Europe.

Tragacanth, or **Gum Dragon**, a gum derived from various plants, but principally from *Astragalus verus*; a low leguminous thorny bush with pinnate leaves and axillary clusters of yellow flowers, native of Asia Minor. The gum is used in the arts and in pharmacy.

Tragedy, see **DRAMA**.

Tragopan, a genus of gallinaceous birds with a crested head and a horn-like carbuncle behind each eye and a distensible wattle under the bill. The plumage is greyish-brown speckled with scarlet and black spots. Five species occur in Asia, and their introduction into Britain has been recommended.

Traherne, Thomas (c. 1637-74), an English writer, a native of Hereford. He was the author of *Roman Forgeries* (1673), *Christian Ethics* (1675), and *A Serious and Pathetical Contemplation of the Mercies of God* (1699), besides poems published in 1906, edited by Dobell.

Traill, Henry Duff (1842-1900), an English author and journalist, born at Blackheath. He was called to the bar in 1869, but devoted his spare time to literature, and in 1873 he became a contributor to the *Pall Mall Gazette*. From 1880-95 he was on the staff of *St. James's Gazette*, the same period wrote for the *Saturday Review*. He was also the chief political leader-writer on the *Daily Telegraph* (1882-97). In 1897 he became first editor of *Literature*, and has published: *Life of Sir John Franklin*, 1896; *Number Twenty*, 1892; *The New Fiction*, 1897 (collections of essays); and *The New Lucian* (a series of 'Dialogues of the Dead').

Trained-bands, see **MILITIA**.

Training, see **ATHLETICS**, **GYMNASTICS**, **PHYSICAL TRAINING**, **ROWING**.

Training Colleges, or **Normal Schools**, are institutions for instructing young teachers in the principles of their profession. The function of T. C. in the United Kingdom is really two-fold, as the colleges aim at giving

a general higher education as well as imparting specific pedagogical instruction. The necessity for such institutions was recognised as early as the 16th century by Richard Mulcaster, an English schoolmaster. The education of the young was too often left to persons who had failed in other professions, or who wished to earn a living while waiting for better opportunities. The same danger to educational efficiency was felt as late as the beginning of the 19th century, and is not wholly absent at the present day. Lancaster and Bell both employed the expedient of training teachers by the monitorial system, in which young people still under instruction helped to teach those still younger. In their efforts to establish a well-organised elementary school system, Bell and Lancaster diverged on the question of religion. In 1808 the Royal Lancasterian Society, afterwards called the British and Foreign School Society, was formed with distinct Nonconformist tendencies. In 1809 Bell's followers founded the National Society for Promoting the Education of the Poor in the Principles of the Established Church throughout England and Wales. From these two societies sprang a system of elementary schools and, later on, a number of T. C. In 1839 the British and Foreign School Society College at Batterssea was founded, and in 1842 the National Society established one at Borough Road. In 1843 government aid was granted in the matter of building T. C.; the British and Foreign School Society founded colleges at Stockwell, Swansea, Bangor, Darlington, and Saffron Walden; while the Established Church responded with diocesan colleges throughout the country. Meanwhile, the rise of colleges of university rank at various provincial centres led to the establishment of day T. C. in 1871. Other religious foundations founded colleges with

a certain aim, as the Wesleyan (1849) and qualification for entrance to these colleges was success in passing the King's Scholarship Examination, latterly known as the Preliminary Examination for the Elementary Teacher's Certificate, or one of a number of or as equivalent; colleges also the nature of test was partial when increased government aid was accompanied by a demand that at least half of the accommodation provided by denominational colleges should be at the disposal of qualified

students without regard to religious opinion. Latterly, T. C. have been founded by county councils and other secular bodies, so that the religious difficulty promises to be a diminishing quantity.

Trajan (Marcus Ulpius Nerva Trajanus) (c. 53-117 A.D.), a Roman emperor, born at Italica, near Seville. He received a rigorous military training from his father and gained further experience in the East and in Germany, where he served with distinction. He was in consequence made consul in 91, and at the close of 97 was adopted by the Emperor Nerva, who gave him the rank of Caesar, and nominated him as his successor. In 101 T., who had succeeded to the throne in 98 on the death of Nerva, set out on his campaign against the Dacians. This occupied him some three years, at the end of which Decabalus sued for peace and T. returned in triumph to Rome. In 114 the emperor left Rome to make war on the Armenians and the Parthians, and in the course of two campaigns he conquered the greater part of the Parthian empire, and took the Parthian capital of Ctesiphon. In 116 he descended the Tigris and entered the Erythraean Sea, but in his absence the Parthians rose against the Romans, and he was forced to return. Besides his military exploits he constructed several great roads, built libraries (e.g. *Ulpia Bibliotheca*), and a theatre in the Campus Martius.

Tralee, a co. tn. and seaport of Kerry, Ireland, 4 m. N.W. of Ardara. Trades in butter and exports grain. Pop. (1911) 10,300. It is situated at the head of Tralee Bay, which has a length of 15 m., and a maximum breadth of 7 m.

Trälleborg, a tn. of Malmöhus gov., Sweden, on the S. coast, 15 m. S.S.E. of Malmö. Just W. of the town a submarine cable runs W. of Rügen Is., Germany. Pop. 9909.

Trammel-net, see FISHERIES, SEA.

Tramontano, a wind blowing along the shores of the Adriatic, of a fresh, northerly nature.

Tramps, see VAGRANTS.

Tramways. By the Tramways Act, 1870, any town council (q.v.), county council, or company can construct T. provided they obtain the necessary powers under a private Act of Parliament or a provisional order (q.v.) of the Board of Trade confirmed by Parliament. An application by a council for a provisional order must be authorised by a resolution at a special meeting attended by two-thirds of the members. When a company apply the consent of the local district council is necessary, though,

when the T. are proposed to be constructed in more than one district, the Board of Trade can dispense with such consent if the sanction of councils representing districts through which at least two-thirds of the T. will be laid is obtained by the company. Before granting a provisional order the Board of Trade generally holds a local inquiry. Similarly, Parliament will not allow a private Bill to be introduced until the consent of the local authorities concerned has been obtained. A local council may, at the expiration of twenty-one years after the grant to a company of the power to construct a T., purchase so much of the undertaking with the approval of the Board of Trade, as is within their district, or after the expiration of six months from the opening of the T. acquire it by agreement. Neither under the Tramway Act of 1870 nor under an order has a council power to work a T., and they must lease them to a company in default of being vested with special statutory powers to run the undertaking themselves. Any county, municipal borough, or urban district council can obtain from the Light Railway Commissioners power to construct a *light railway*, i.e. a tramway worked by steam or electric power upon the public highways (Light Railways Act, 1896).

Iron rails for T. principally for use at collieries were first introduced by James Outram, an engineer, in 1776, at the Duke of Norfolk's colliery at Sheffield. Other works were soon carried out by Outram in many parts of the country, and they were called 'Outram ways,' and it is said that the first portion of the word was omitted and the word 'tramway' adopted. Passenger Ts. were first introduced in America in 1832, and were laid down between New York and Harlem. A system which spread rapidly in America was the grooved rail, the invention of a Frenchman named Loubat about 1852. These rails were fixed to longitudinal wooden sleepers. The groove was, however, found to be dangerous for wheel traffic and a stepped rail was adopted, and these are still largely used in America. The first T. in Great Britain was laid down in Birkenhead by Francis Train in 1860. He used the step rail, but this was dangerous and inconvenient for the traffic and the grooved rail was substituted. Liverpool then became the first town of any size to adopt and lay down a T., the system being commenced in 1868. The rail, a flat grooved one, was fixed to longitudinal timber sleepers with the bars laid on a concrete bed. It was found, however, to be dangerous and unreliable

as the rails were liable to shift on the timber and become loose. To obviate this various devices in the form of chairs and other built-up systems were adopted. Charles Burn invented, in 1860, a girder rail, which had the groove planed out after rolling, entailing enormous expense in the production of the rail. Owing to this it was very little adopted. In 1879 an improvement was effected and patented by John Kerr, who produced a girder rail with the groove rolled at the same time, thus materially lessening the cost. This rail was first used at Ipswich and afterwards at Woolwich, Wigan, and Gateshead. This form of rail has proved very satisfactory and is now the type of rail generally adopted. The fish-plates were originally too large to fit in to the web of the rail closely, but now they are fixed flush with the web. The latest form of joint is the welded joint. Cars propelled by electricity were first introduced in 1835. Many systems of taking the current were devised, some having a third rail alongside the track as a conductor rail. The Portrush and Giant's Causeway electric T., 1883, was the first T. in the United Kingdom to take current from a conductor. The first T. to carry the public in America was constructed in 1884 at Providence, Rhode Is. The cable system of T. was adopted largely in America, and the success in its working led to several systems being constructed in England, Birmingham (central), Edinburgh (northern), Brixton (now electric conduit system), Douglas (Isle of Man), and Matlock. The cable T. at Highgate Hill was the first one of its kind in this country, having been opened in 1884; it was only running for ten years. Birmingham and Edinburgh systems were both opened in 1888. The only remaining system of this kind of T. in this country to-day is that at Edinburgh, all the others having been superseded. It is said that to construct a double-track system for a three minutes' service costs £20,000 per m.

There are two systems by which the current is delivered to the cars. In the more general system the power is distributed to the system with a pressure of 550 volts at the generator terminals. This gives a pressure of 500 volts at any part of the trolley wire, and the cars are worked by a continuous current. In the other system the power is distributed at a high voltage in the three-phase form. It is then transmitted through three-core paper insulated lead-covered cables to sub-stations situated at convenient points

along the T. route. These sub-stations are equipped with motor-generators which transform the high pressure three-phase power into a continuous current of about 500 volts. This system is called the alternating system.

There are three systems of electric T.: (1) The overhead trolley system; (2) the conduit system; (3) the surface contact system.

(1) *The overhead trolley system.*—

This system was largely adopted in America. In this country, however, great difficulty was experienced in getting permission to erect the overhead wires. However, Leeds constructed the Roundhay line in 1891 on this principle. Part of the S. Staffordshire T. were also converted to the system, and since then the overhead trolley has been generally adopted. A copper conductor is generally supported on insulators at a height of about 20 ft. from the ground by steel transverse wires stretching from poles on either side of the road, or direct by the insulators onto arms stretched on either side of one central pole between the tracks. This copper-wire conductor conveys the electricity from the sub-station to the tramcar. The tramcar is supplied with a trolley pole, having a wheel or bow at the upper end next the copper wire. This wheel collects the power and conveys it to the motors and other apparatus of control on the car. The power, after it has passed through the motors on the car, is conducted to the wheels and then to the rails. Each rail is bonded to the other by means of copper wires and form a conductor along which the power is conveyed to the sub-station.

(2) *The conduit system.*—This is the system that has been favoured mostly by London and Bournemouth. The London County Council system is the largest of its kind in the world and the most modern. Many examples are also to be found in Europe and America.

The system is a compromise midway between the two rails of each track, and the current is conveyed to the cars by means of a plough which passes through a slot in the road and is also fastened to the car. The London County Council's system has the slot rail formed of Z-section rails bolted at intervals to heavy cast-iron yokes, the width of the slot being $\frac{1}{2}$ in. The slot rail weighs 60 lbs. per yd. and is 7 in. high. The conductors are two in number and are of soft steel rods weighing 22 lbs. per yd., carried in porcelain insulators placed 15 ft. apart, which are fastened to the underside of the slot rails. The sur-

face contact is $3\frac{1}{2}$ in. in depth. The conduit has a depth of 1 ft. $9\frac{1}{2}$ in. from the top of the slot rail, and the base of the yokes, which are bedded in concrete, is 1 ft. 11 in. from the surface.

(3) *The surface contact system.*—Although many surface contact systems have been invented, only very few have been put into practice, and then only with questionable success, as they appear to be more or less unreliable. This system consists of contact studs, which are placed about 15 ft. apart along the centre portion of the track from which 'skates' collect the current for the car propulsion. The systems at present working successfully are those at Wolverhampton, constructed on the 'Loraln' principle, and at Lincoln, constructed on the 'G. B.' (Griffiths-Bodoll) system. The 'Loraln' principle is worked as follows. It consists of two main parts: (1) The insulating material of stone, and (2) a metallic cover. When a car is passing over a stud the magnets on the car magnetise the iron cover. The armature in the slot is raised by the magnetic influence and thus brings the carbon contacts together and in turn delivers the current to the car motors by means of the collecting shoe or 'skate.' The 'G. B.' system is worked as follows: the current is conveyed from the generating station by means of a bare stranded galvanised iron cable carried on insulators in a 5-in. stoneware pipe which acts as a conduit. The contact plates consist of T-iron bedded with bitumen in solid granite. The stem of the contact projects downward into the conduit. The lower end is slotted out, and in it a sliding switch is supported, by wire and slides, between copper faces. In the fork formed in the switch, contact is secured at the lower end of the switch by means of copper clips, connected with the stem by flexible copper leads. Connection with the conductor and contact stud is effected by powerful magnets on the car, working as follows: As the car passes over the contact stud the stem of the contact is magnetised and the plunger switch, which has a carbon contact, moves downward towards the cable conductor and immediately makes a contact with this conductor. The current then passes to the contact plate and is conducted through the collecting skate on the car to the motors. When the car leaves the stud the plunger switch is disconnected from the stud by means of a powerful spring, withdrawing the carbon contact, and the current is immediately cut off from the stud. In some cases the stud is

still 'alive' after the car has passed and to overcome this difficulty extra 'skates' are sometimes provided on the cars, which trail after the collecting skate and short-circuits the live stud with the track rail. This system was laid down by the London County Council in the East End of London, but was afterwards removed.

Comparative costs of tramway systems.—Under normal conditions and excluding cable work and other items, which are common to all systems, the cost of track per mile averages out at about the following figures: Conduit system, £17,000; 'G. B.' system, £11,000; overhead trolley system, £10,000.

Railless trolley traction.—This form of traction is at present in its infancy in England, though it has met with success in Austria, Hungary, France, and Italy. The cars are run on the ordinary roads by means of double-trolley wires. Two systems are in vogue at present, the flexible system and the pole system. The first uses a truck-like collector of the current, having four grooved wheels, two on the positive and two on the negative wires. The pole system is similar to that on the electric overhead system, though, of course, two poles and two wires are needed to obtain a 'return.' A recent Board of Trade return shows that the T. in the country now have a mileage of 2637 route m., 1777 of which are owned by local authorities. The total capital expenditure amounts to £52,500,000, representing 172 undertakings. In the year 1911-12 the number of passengers carried represented sixty-nine times the whole population. The net receipts of the local authorities owning T. amounted to £4,250,000, nearly £500,000 of which was paid in relief of the rates. The capital expenditure amounted to £13,623 per m. of single track for track and works only, but the total cost was £18,005, including all items in the construction. See Professor R. H. Smith, *Electric Traction*; Wilson and Lydall, *Electric Traction*; Ashe and Kelly, *Electric Railways*; W. R. Bowker, *The Practical Construction of Electric Tramways*.

Trance (Lat. *transire*, to cross over), a term somewhat loosely applied to many abnormal states of consciousness, particularly to sleep of a cataleptic nature. In former times the condition of T., whether it consisted of a deep sleep or an exalted state of consciousness, was attributed to the passage of the soul out of the body of the subject, and the invasion of another spirit for the time being. The theory of spirit possession has not yet gone by the board; earnest, and, in

some cases, scientifically-minded investigators are constantly studying such phenomena. From the medical point of view, the T. is held to be a condition of hypnosis, in which the subject may be susceptible to impressions of a hallucinatory nature, and may be entirely impervious to ordinary physical stimuli. See F. W. H. Myers, *Human Personality*; F. Podmore, *Modern Spiritualism*.

Tranent, a small tn. in Haddington-shire, Scotland. Pop. 1,000. Hasan mines.

(1911) 4369.

Trani, a seaport of S. Italy, prov. Bari, on the Adriatic. Trades in wine, figs, oil, almonds, and grain. The harbour has lost the importance it held during the Crusades. Pop. 32,000.

Tranquebar, a maritime tn. of Madras, India, on the Coromandel coast in the Tanjore dist., at the mouth of the Cauvery, 165 m. S. of Madras. It was purchased by Britain from the Danes in 1845. It has a fort, a mosque, and several pagodas. Pop. 13,142.

Transbaikalia, or Dauria, a prov. of E. Siberia, to the E. of Lake Balkal, almost equal in size to Austria-Hungary. It consists for the most part of a plateau, about 2000 ft. above sea-level, covered with forests, marshes, and prairies, with the mts. of Khamar Daban, Barguzin, and Yablonovi rising above it. The prov. is watered by the affluents of Lake Balkal, and by tributaries of the Amur and Selenga. The climate is, on the whole, dry. The chief industries are cattle-breeding, hunting, fishin and to a certain extent, There are no manufs. of but fur is largely exported.

prov., Khita; other chief towns: Barguzin, Nerchinsk, Selenginsk, and Verkhneindinsk. Area, 229,520 sq. m. Pop. is very sparse, 70 per cent. consisting of Russians. It is estimated at about 833,400.

Transcasian Province, a prov. of Asiatic Russia, bounded on the E. by Khiva and Bokhara, W. by the Caspian Sea, N. by Uralsk, and S. by Persia. It has an area of 213,855 sq. m., and a pop. of 440,800. The surface is partly mountainous and partly desert, but there is a fertile region at the base of the Kopet Dag, where wheat, cotton, and fruit are grown, and sheep and cattle pastured. The principal rivers are the Murghab and the Heri-rud, which are useful for irrigation purposes. The chief minerals include gypsum, sulphur, and the petroleum is important. The inhabi

mainly Turkomans and Kerghiz, with a sprinkling of Russians. The Kara-kum Desert extends from the Ust-Urt Plateau, on the E. of the Caspian, to the borders of Afghanistan, encircling the oasis of Merv, which is a depression of the Murghab Valley. The town in the oasis has no ancient history, and is referred to in the *Zendavesta*. Alexander the Great added to its importance, but it was destroyed by the Mongols in the middle ages. The ruins at Balam mark its site. Cap. of the prov. is Ashkabad.

Transcasian Railway, a gov. owned line of Asiatic Russia, with a terminus at Krasnovodsk, a tn. on the S.E. shore of the Caspian Sea. It skirts the southern boundary of the Kara-kum Desert, passing through Merv, Bokhara, Samarcand, Khokand, to Andijan, where a branch line connects with

borders. The gauge is 5 ft., and the total mileage is 2380 m.

Transcaucasia, the southern div. of the gov. of Caucasasia, comprising the military districts of the Black Sea and the gov. of Baku, Elisavetpol, Erivan, Kutais, and Tiflis, together with the provinces of Batumi, Kars, and Daghestan. It has an area of 95,402 sq. m., and embraces the most populous and most fertile parts of Caucasasia, the valleys of the Rion and the Kura. The chief crops are maize, rice, tobacco, and cotton, but various kinds of fodder are also cultivated, viz., hay, rye-grass and lucerne. The vine is also largely grown, and

of for bein is animals are domestic industries are extensively carried on and exhibit a high degree of technical skill and artistic taste. The chief town is Tiflis. Pop. 6,695,500, belonging to various races.

Transcendentalism, has a double significance: (a) philosophical, and (b) theological. It is associated with the use of the previous idea of a *a priori* (or intuitive) as opposed to a *posteriori* (or experiential) cognition. In a broader sense T. signifies the attitude of mind which is allied to the idea of a supersensuous consciousness, an intuitive of divine truth, as opposed to rationalism. The most

prominent school of theological T. began in New England (the Transcendental Club, 1836), and included Emerson, Ridley, Bronson, Alcott, Thoreau, Margaret Fuller, and others.

Transept, in architecture, that part of a building which lies across, or in a direction at right angles to the main axis.

Transfiguration, Feast of the (Aug. 6), commemorates the important event in our Lord's life narrated in Matt. xvii., etc. In the English Church it is a black-letter day, but it is a red-letter day in the American Church.

Transformer, see **ELECTRIC DISTRIBUTION**.

Transformism, or **Transformismo**, the name given to the parliamentary policy inaugurated in 1884 by Signor Agostino Depretis, when prime minister of Italy, which effectually and completely broke up the old party organisations. Under this system, which purported to unite moderate men from all parties against agitation of the extreme Left, ministers were selected from those heads of factions and interests which commanded most votes in the chamber. It was undoubtedly intended by Depretis as a *bona fide* unifying constitutional device, but was not popular with the Italians and was hotly vilified by the extremists.

Transfusion, the passage of fluid from one vessel to another, especially the introduction of fluid into the blood-vessels. Saline solutions are usually used for this purpose, but T. of blood alone provides the necessary ingredients when much blood has been lost. Communication is made, in the direct method, from one person to the other without the blood being exposed to the action of the air.

Transit Instrument, an astronomical instrument used for ascertaining the right ascension of a star, i.e. the exact moment of its crossing the meridian of a place. It is constructed in various forms including the portable. A telescope is accurately mounted on a horizontal axis which turns on pinions in Y bearings carried on two pillars; this axis is placed due E. and W., and the telescope is thus capable of moving in a vertical plane, which is that of the meridian. A small graduated circle fixed to the axis enables the observer to adjust the telescope to the approximate declination. In the focal plane of the telescope a vertical 'wire,' of spider's web, is placed accurately central, to give the meridian, and other parallel wires are arranged equidistantly. Two horizontal wires are arranged, one on each side of the middle of the vertical

wires, and fairly close. As soon as the star enters the field of view, the telescope is adjusted so that the image travels between these wires. At the moment the image is bisected by the middle vertical wire, the observer presses a button which registers the exact moment on an electric chronograph. Delicate spirit levels are carried for testing the level of the horizontal axis, and a reversing gear is provided whereby the instrument is lifted and reversed, so that the pinions change places and the opposite part of the meridian may be observed. The reticle in the focal plane is illuminated by means of a lamp carried on a bracket, and usually transmitting its beams through the horizontal axis.

Broken transit: In this instrument the eyepiece is fixed at right angles to the telescopic axis, and a prism carried in the central tube reflects the image of the star, which can thus be more conveniently seen. Correction must be applied for 'flexure of axis.' **Prism vertical transit**: The horizontal axis is here placed due N. and S., so that the telescope moves in a vertical circle passing through due E. and W. The *transit* or *meridian circle* is a more massive instrument, arranged for reading the declination of the star accurately as it crosses the meridian. The graduated circle is in this case much larger, 2 ft. to 4 ft. in diam., and is sometimes duplicated; the graduations descend to 5 min., sometimes to 2 min. The movement of the telescope is read by the position of the marks on the circle opposite a fixed index. Reading is carried out by means of a micrometer microscope, in the focal plane of which are cross-wires, the intersection of which appears at the exact reading on the circle. The wires are capable of travel by means of a micrometer screw, the head of which is graduated. The movement of this screw necessary to bring the intersection of the wires to the nearest mark on the circle gives the fraction of the division; this can usually be read to within an error of 2 sec., or 1/648000 of the circle. In another form of the instrument the eye-piece of the telescope is arranged to travel by means of a micrometer screw until the wires reach the star, at which position it is kept fixed. At the exact moment contact is arranged to give the time automatically on the chronograph, with a view to eliminating the 'personal equation.' Such an instrument was erected at the Cape in 1903. The methods of transit observation were first used by Tycho Brahé, but the instrument was invented by Olaus Roemer in 1689. The first

Greenwich instrument was mounted in 1850.

Transition, in architecture, the passage from one style to another. This process is always slow, and hence there is always a period in which the new features are being tentatively introduced.

Transkei Territory, one of the most productive regions of S. Africa, principally in the prov. of Cape of Good Hope.

Translation from one language to another is the art of adequately rendering the writings of one language into the language of another. The whole virtue of a T., as such, lies in its adequacy, and here a slight distinction must be made between two kinds of Ts. The lower kind attempts to convey the literal meaning of its original, and hence adheres slavishly to the text even at the cost of forced and involved constructions. Ts. from a language at a high degree of culture into a language destitute or almost destitute of literature are apt to be of this kind. Slavish verbal accuracy is the great fault of the earliest Ts. made into a Teutonic tongue—the T. of the Scriptures into Gothic by Ulfilas. The aim and method of the higher T. is expressed by Dryden in language which has never been bettered. Speaking of poetical T. he says, 'Thus it appears necessary, that a man should be a nice critic in his mother-tongue before he attempts to translate a foreign language. Neither is it sufficient that he be able to judge of words and style; but he must be a master of them too; he must perfectly understand his author's tongue, and absolutely command his own. So that, to be a thorough translator he must be a thorough poet. Neither is it enough to give his author's sense in good English, in poetical expressions, and in musical numbers; for, though all these are exceedingly difficult to perform, there yet remains a harder task; and it is a secret of which few translators have sufficiently thought—that is, the maintaining the character of an author, which distinguishes him from all others, and makes him appear that individual poet whom you would interpret.' There is a last kind of T., which can best be explained by naming its great example, Fitzgerald's T. of the *Quatrains* of Omar Khayyam, the Persian astronomer and poet. Here the T. is not the minister, but the equal and even the superior of its original.

Transleithania, the name given to the western part of the E.) half of Hungary, and the Kingdom of Croatia-Slavonia, and the Kingdom of Leitha

R. The Austrian half is called Cisleithania. Budapest is the capital.

Transmigration, or Metempsychosis, the T. of the soul, as an immortal essence, into successive bodily forms, either human or animal. This doctrine appears to have originated in Egypt. The Egyptians are, moreover, the first who propounded the theory that human soul is immortal, and when the body perishes it enters into some other creature who may be born ready to receive it, and that when it has gone all the rounds of all the created forms on land, in water, and air, then it once more enters the human body horn for it; and this cycle of existence for the soul takes place in 3000 years. Plato extends the cycle of existence to 10,000 years, which is divided into periods of 1000 years, after the lapse of which the souls undergo judgment, and are condemned to punishment or admitted to everlasting happiness. Pythagoras, who is supposed to have travelled in Egypt, brought this fantastic doctrine into Magna Græcia, and made it a prominent part of his teaching. No doubt the Egyptian custom of preserving the mummies of cats, crocodiles, and some other creatures, had its origin in the belief that they had been inhabited by souls which might some day claim these bodies for their own.

Transmission of Power, *see* PNEUMATIC DISPATCH, GEARING, PULLEYS, TRANS, ELECTRIC DISTRIBUTION, etc.

Transpadane Republic, *see* CISALPINE REPUBLIC.

Transplanting. Removing seedlings and other plants and trees from one situation to another is found to improve the progress of many plants and specially those of the cabbage tribe, the point of the tap root being broken and a mass of fibrous roots caused to form. In T. shrubs and trees the fibrous roots should be disturbed and prepared for them. Deciduous shrubs and trees are best moved between October and March, while April is the best month for moving evergreens. Special T. machines are used for moving large trees.

Transport, the process of carrying supplies for a military expedition. The armies of the middle ages invariably lived on the country in which they were campaigning, with the result that the inhabitants were quickly rendered destitute of food and the army itself became ineffective through the impoverishment of the country. In modern armies a

specialised branch of the military organisation is devoted to questions of T. and supply, and the British army, through the necessity for colonial and punitive expeditions, possesses a particularly well-developed T. service. Road T. is worked by the Army Service Corps. The supply of field units is divided into two lines, first and second. The first-line wagons carry ammunition, tools, and ambulance supplies, and is in immediate contact with the fighting line; the second line carries camp supplies with a reserve of ammunition, tools, medical supplies, etc. The chief officer of T. is known as the Director of T. and Remounts, and is directly commanded by the quartermaster-general.

Transportation. According to Stephen the earliest instances of T. as a punishment in England probably occurred in the reign of Charles II., when pardons were granted to persons under sentence of death, conditionally on their being transported for a number of years—usually seven. T. was unknown to the common law (*q.v.*), a fact which seems to be capable of explanation on the ground that England had no colonial empire of any pretensions before the Stuart period. There was, however, at common law, an analogous punishment, *viz.* exile, which followed on conviction when a criminal took sanctuary and confessed; the criminal in such case was permitted to leave the kingdom under an oath of abjuration binding him never to return. T. was first legalised by an Act of 1719. During the 18th and early part of the 19th centuries, numerous Acts were passed by which various terms of T. with alternative terms of imprisonment, and, in some cases, whipping either as an alternative or cumulative punishment, were allotted to specific offences. These statutes appear to present no sort of consistent principle, for in certain classes of cases the sentence was T. for life; in two the punishment was absolute without alternative; while in another, power was given to transport for any other term without fixing any minimum term of T. or any alternative term of imprisonment. T. was gradually abolished between 1853 and 1864, principally because the colonies objected to receive the convicts; penal

prisoners under sentence of penal servitude. See LABOUR COLONIES.

Transporter Bridge, see BRIDGE.

Transposing, in music, signifies the changing of a piece of music to another key. In the case of a vocalist T. is an easy matter, but in the case of instrumental music it requires much musical skill.

Transubstantiation (Lat. *transubstantiatio*, change of substance) indicates the change which is believed by Roman Catholics to take place in the Eucharist elements of bread and wine, in virtue of the consecration. According to the Roman Catholic doctrine, 'the whole substance of the bread is changed into the body of Christ, and the whole substance of the wine into His blood, the species alone remaining.' The precise meaning of 'species,' or, as it is sometimes put, 'accidents,' in this definition is not shown, but popularly it may be said to mean the appearances, *i.e.* those qualities or conditions which produce upon the senses the impression of the presence of bread and wine. T. does not imply that the body and blood of Christ are formed out of the substance of the bread and wine, but that in virtue of the Eucharist consecration, the substance of bread and wine cease to exist, and the body and blood of Christ take their place.

Transvaal, an original prov. of the Union of S. Africa, lies immediately N. of the Orange Free State and S. of Southern Rhodesia, bounded E. by Portuguese E. Africa and Swaziland, and W. by the prov. of Cape of Good Hope and the Bechuanaland Protectorate. The Limpopo or Crocodile R. flows along its N. frontier, and the Vaal R. marks its S. border. The area of the province, which is divided into twenty-three districts, is 110,426 sq. m., with a population of 1,676,611, of whom 420,831 are whites or Europeans, 1,224,155 are natives, the balance of 31,625 being made up of other coloured races. In 1903 about 7000 sq. m., including the districts of Wakkerstroom, Utrecht, and Vryheid, were annexed to Natal. The surface has an average elevation of 4000 ft. A plateau, called the High Veld or Hooge Veld, extends across the province, broken here and there by low mountains and detached heights. The chief mountains are the Witwatersrand, lying between Pretoria and Johannesburg on the E. and Mafeking on the W.; the Lydenburg and Barberton Mts. in the district of Barberton; the Zand River Mts. in the district of Waterberg; and the Murchison and Zoutpansberg ranges in the Zoutpansberg district. The land slopes in directions—N.

But as the Penal Servitude Acts authorise the carrying out of the sentence in any part of the dominions, the difference between T. and these two punishments seems verbal only; and again, the provisions of the Act of 1719 are still in force as regards

Vaal, and E.

to the sea. The High Veld forms the watershed between the basin of the Limpopo and the basin of the Vaal, their numerous tributaries, including the Olifants R., the Ingalele, the Zand R., the Marico, and numerous other streams flowing S. from the Witwatersrand. The rivers in the S.E. of the province flow towards Delagoa Bay. The largest lake is Lake Chrissie, N.E. of Ermelo. The country has a healthy climate except in the low-lying tracts in the N. and E. The rainy season is in the summer, when severe storms occur; the winter is dry. The chief industry is gold-mining, extensive mines being in operation near Johannesburg, Witwatersrand, and Barberton. The output of gold exceeds £30,000,000 annually, and diamonds are exported to the value of £1,238,000 yearly. Other exports include horses, mules, tobacco, coal, wool, clothing, haberdashery, jewellery, skins, hides, horns, machinery, hardware, and vehicles. The total exports amount to about £34,000,000 annually, and the imports to £20,000,000. There are manufactures of coaches, wagons, machinery, flour, bricks, tobacco, tiles, pottery, malt liquors, and brass and iron products. The veld supports large numbers of cattle, horses, sheep, and pigs. The annual expenditure of the province (£6,000,000) slightly exceeds the revenue, and the public debt is about £40,000,000. There are 707 (including 12 coloured) schools, with about 54,500 pupils. The English language is being taught in the Dutch schools, and, later on, it will be predominant in the higher grades. The Dutch churches take first place, being followed by the Anglican, Presbyterian, Methodist, Roman Catholic, Lutheran, etc. The Transvaal Police consists of about 1550 officers, non-commissioned officers, and men. The capital is Pretoria (pop. 48,609), but the largest town is Johannesburg, with a pop. of 237,220, one-half and one-half coloured. There are 2400 m. of government railway and 26 m. of private railway in the province. The Boers, known to the Boers, Colony in command of the Zulu warriors of Mosokatshe, the revolted general of Chaka, across the Limpopo. After the overthrow of Dingaan by Pretorius, the independence of the republic was acknowledged by Britain at the Zand River Convention of 1852, and Marthinus Wessels was elected president three years later. The Boers were constantly at war with the natives, especially on the N. and E. borders,

and in 1876 a commando was sent to attack Sekukuni, a native chief living S. of the Olifants R., which, however, was defeated. This reverse caused the Transvaalers to appeal to Britain for help. In consequence of their financial difficulties and troubles with the natives, the country was annexed to Britain in 1877 by Sir Theophilus Shepstone. Three years later the Boers took up arms for the restoration of their independence, and after the fall of Collooy at Majuba Hill, they gained their object in 1881, subject to the suzerainty of Queen Victoria. The discovery of gold in 1886 brought a great influx of 'Uitlanders,' who were looked upon with disfavour by President Kruger. These Uitlanders were treated with great harshness, and difficulties arose, leading to the Jameson Raid and the gauntlet being thrown down to Britain in 1899, culminating in the Boer War, which resulted in the loss of the Boer independence in 1902. In 1910 it was merged in the Union of S. Africa.

Transverse and Transversal, in geometry, the straight line drawn intersecting two parallel straight lines. The angles formed are thus related: (1) the exterior angles on the same side are thus related: (2) the exterior angles on the same side are thus related: (3) the exterior angles on the same side are thus related: on the same side is equal to two right angles.

T. ... since ... gar ... por ... its ... vanian Alps divide the country from Roumania. The area was 23,700 sq. m. The surface is ... in parts, and is watered by the numerous affluents of the Danube and the Theiss. The minerals embrace gold, silver, copper, iron, quicksilver, lead, and salt. Stock raising, agriculture, and fruit growing are important industries. ... is made and brandy ... tile plain in the centre ... yields large crops of

maize, wheat, rye, flax, hemp, potatoes, a Kronstadt, the most 2,459,000, Magyars, Greeks, Armenians, and Slavs. T. corresponds with the Roman Dacia, which was overrun by the Huns under Attila in the 5th century. This invasion was followed by incursions from the Gopide, the Avars, the Slavs, and the Magyars under Almus, who appeared at the close of the 9th century. In the 13th century many thousands of Germans settled in T., which in the 16th century became a principality when John

Zapolya, the woiwodo of T., threw off his allegiance to the emperor and acknowledged the suzerainty of the sultan. In the early part of the 19th century efforts were made to bring about a union with Hungary, which ended in T. being made a crown land of Austria in 1849. It was finally merged into the Austro-Hungarian empire in 1868.

Trap, a term applied vaguely, in geology, to any dark-coloured fine or medium grained basic igneous rocks, such as dolerite and diabase. Mica-trap is the name applied to mica-lamprophyre. These trap rocks occur as dyke rocks and lava flows.

Trapa, or Water Caltrops, a genus of aquatic floating plants (order Onogoraceae) bearing white flowers, followed by hard fruit, the kernel of which consists largely of starch. The large black spiny fruits of *T. natans*, water chestnut, or Jesuit's nut, are used as food in Southern Europe. The sweet white kernels, Singhara or horned nuts (*T. bispinosa*), are largely eaten and used medicinally in India. These and other species are sometimes grown in tanks in Britain.

Trapani, a seaport on the N.W. coast of Sicily, cap. of the prov. of the same name, stands on a small peninsula 30 m. N. of Mazzara. It is an episcopal see, and exports wine, olive oil, salt, cheese, etc. There is trade in coral and mother-of-pearl goods. It was originally a Carthaginian fortress. Pop. 70,000.

Trapezium, the multiple star θ Orionis. There are ten stars, of which four, magnitudes 4.7 to 8.0, form the corners of a trapezium. They form the nucleus of the great nebula in Orion, and show the 'early' type of helium spectrum.

Trapezium and Trapezoid, in Euclidian geometry, are plane quadrilateral rectilinear figures; the former has no parallelism between opposite sides, the latter has one pair of opposite sides parallel.

Trapezus, see TREBIZOND.

Trapp, Joseph (1679-1747), a writer, born in Gloucestershire, and graduated at Wadham College, Oxford. He began his literary career early in life, and afterwards identified himself with the Tory party, acting for Dr. Sachverell at his trial. He was also chaplain to Sir Constantino Phipps and to Lord Bolingbroke. Among his works are: *Prælectiones Poeticæ*, 1711, and *Peace*, 1713.

Trapping, the art of so constructing more or less mechanical snares so as to capture or kill some animal. The art is probably one of the oldest in existence, since even the earliest and most uncultured peoples of whom we have any record used traps,

although they were usually devoid of any mechanical contrivance, and merely consisted in the digging of a cavity into which the unsuspecting victim fell. In many cases traps are used simply for the purpose of capturing the victim without injury. Bird traps, on the cage principle, and door traps may be regarded in this category. Other traps are so constructed that they seize the victim, but at the same time, except under special circumstances, do it no injury; whilst a third variety consists of a mechanical contrivance not only for capturing but for killing the victim as well.

Trappists, a religious order which owes what was practically its foundation to Dominique Armand Jean le Bouthillier de Rancy (1626-1700). Until the age of thirty-four De Rancy led the voluptuous life of a courtier-priest. Then in 1660 a sudden change came over him and he retired to live a life of austerity and devotion in the Cistercian abbey of La Trappe, which had long formed part of his possessions. The abbey, which had been founded about the middle of the 12th century, was lax in discipline, and it was with the greatest difficulty that De Rancy introduced a stricter observance. The new community devoted themselves to the observance of strict silence and seclusion from the world, to hard labour, to total abstinence from wine, eggs, fish, and all seasoning of their simple diet of bread and vegetables.

Trasimene Lake, also known as Lake Perugia, in Umbria, Italy, 12 m. W. of the tn. of Perugia. In 1898 it was partially drained into the Tiber, some 5500 acres of land being reclaimed. Famous for Hannibal's great victory over the Romans under Flaminius, gained on its shores in 217 B.C.

Traun, Lake, is situated in Upper Austria. It is about 7 m. long, and is 1385 ft. above sea-level, having on its E. side the Traunstein (5450 ft.).

Trautenau a tn. of Bohemia, Austria, on the Aupa, 74 m. N.E. of Prague. It is chiefly engaged in the linen industry. Pop. 16,096.

Travancore, a feudatory state of the Madras Presidency, India, stretching along the Malabar coast from Cape Comorin to Cochin, its shores being washed by the Indian Ocean. It is 140 m. long, with a maximum breadth of 70 m. Area 7129 sq. m. Pop. 3,428,975. The coast is low, but the foothills of the Western Ghats diversify the scenery and slope towards the ocean. Its capital is Trivandrum. The principal products are coir, coconuts, araca nuts, beeswax, ginger, cardamoms, coffee, pepper,

and timber. See *Mateer's Native Life in Travancore*, 1883.

Travellers, see **COMMERCIAL TRAVELLERS**.

Traveller's Joy, see **CLEMATIS**.

Traveller's Tree, or *Ravenala madagascariensis*, a tree with long and large fan-shaped leaves, the petioles or leaf stalks of which form a large cavity at their base. In this water collects and is drunk by animals and travellers.

Traverse City, in Michigan, U.S.A., on the Boardman R., the co. seat of Grand Traverse co. Has a good climate and picturesque scenery, and is resorted to by tourists in the summer months. Manufs. agricultural implements, sleighs, furniture, leather, flour, etc. Pop. (1910) 12,115.

Traverser Bridge, see **BRIDGE**.

Travertine, or Calc-sinter, is porous calcareous material deposited from mineral springs (q.v.). It may be chalk-like in texture, but is often hard enough for building stone, many of the buildings in Rome (St. Peter's) being built with it. At San Filippo the T. is deposited at the rate of 3 ft. a year.

Travnik, a prov. and tn. of Bosnia-Herzegovina, Austria, on the Lasva, 45 m. N.W. of Sarajevo. It has an old castle and a horse-breeding establishment. Pop. 6660.

Trawling, see **FISHERIES, SEA**.

Treacle, the dark-brown mother liquor remaining when sugar is crystallised from the expressed juice of the sugar-cane. The T. or molasses contains about 50 per cent. of sugar, which does not crystallise owing to impurities. In the W. Indies, T. is used for the distillation of rum, but processes are also in vogue for extracting nearly the whole of the sugar.

Treacle Bible, the 1568 edition of the Bishops' Bible, is so called from its rendering of Jer. viii. 22, 'Is there no treacle in Gilead?' where the A.V. has 'balm.'

Treacle Mustard, or *Erysimum cruciferum* formerly given *arvense*.

'caut' language known as 'the everlasting staircase,' worked by persons treading on steps fixed on the periphery of a horizontal wheel. It is used chiefly as a means of prison discipline, or to give useful employment in the shape of grinding corn or moving machinery to persons imprisoned for crime, and comes under the category of 'hard labour.' The prisoners hold on to a hand rail and work in separate compartments, and the speed is regulated by a warder by means of a lever. It is now almost obsolete as a form of punishment.

Treason means treachery against the sovereign. By the Statute of Treasons, 1352, it is T.: (1) To compass the death of the king, queen, or their eldest son. 'Compass' imports design, which must be manifested by an overt act (e.g. providing weapons), for idle words do not now constitute T. though they may amount to a misdemeanour. The conviction of Peachum and Sydney shows that the commission, even without publication, of 'treasonable' ideas to writing is T., but it is extremely doubtful whether a modern judge would direct a conviction for T. at the present day. (2) To violate the king's companion, eldest unmarried daughter, or eldest son's wife. (3) To levy war against the king in his realm. This includes levying war to reform religion, remove councillors, or redress grievances, inasmuch as private persons may not forcibly interfere in grave matters; e.g. in Anne's reign Damaree and Purchase were convicted of T. for burning certain dissenting meeting-houses, the court inferring a general design against the state. (4) Adhering to the king's enemies in his realm by giving them aid in his realm or elsewhere. The overshadowing power of present-day central governments makes it grotesque for any individual to hope to approach a project of rebellion in England with the prospect of even partial success. When the case of R. v. Lynch (1903) came before the courts there had not previously been a charge of high T. tried for sixty-two years. It was moved to quash the indictment (q.v.) in this trial on the ground that each count charged an adhering 'without the realm' (viz. in the Transvaal), and so disclosed no statutory offence. The court held that the statutory words did not mean merely that the accused *being in the realm* has been adherent to the king's enemies *wherever they were*, for that so narrow a construction not only would enable an Englishman to engage with a hostile power against his own country so long as he took care to remain abroad, but also makes the words 'or elsewhere' meaningless. The case also decided that the Naturalisation Act does not enable a British subject to become naturalised in an enemy state in time of war, and that to do so is in itself an overt act of T. (5) Counterfeiting the king's seal or money or importing money (not now T.). (6) Slaying the chancellor, treasurer, or king's justices. The punishment for T. was formerly hanging, drawing, and quartering after the traitor had been dragged to the place of execution on a hurdle; it is now hanging only. T.

cannot be committed against a *de jure* king who is not also *de facto* king.

Treasure Trove. Money, plate, or similar articles discovered hidden in the earth or some other secret place for so long a time that the owner is unknown. In default of finding the owner, the established principle of English law is that the crown is entitled to the treasure (*see* CROWN). By civil law (*q.v.*) the finder of goods hidden in his own soil was entitled both as owner and finder; but if the things were found by one person in the ground of another, one half went to the owner of the ground and the other half to the finder; if found on public land, half went to the find and half to the finder.

Treasury, a government department which controls the management collection, and expenditure of the public revenue (*q.v.*, and *see also* CONSOLS, PUBLIC DEBT, and TERMINABLE ANNUITIES). In the Plantagenet period the T. was known as the *Scaccarium* (Exchequer), and was so named because the committee of the king's continual council (*see* CABINET and PRIVY COUNCIL) when sitting for revenue purposes sat round a *chequered* table in a room which was therefore called the *Scaccarium*. The old Exchequer was divided into the Upper Exchequer or Exchequer of Account, and the Lower Exchequer or Exchequer of Receipt, the former department recording and checking payments made for the service of the state and the sovereign, the latter receiving payment of royal dues payable by local officers appointed for their collection. The head of the Exchequer was the Treasurer, an official who became, during the reign of Elizabeth, the most prominent official in the state. In 1612 the T. was placed in commission, and that is its present constitutional condition, although its real head is the Chancellor of the Exchequer. The titular head is the First Lord of the T., who is almost invariably the Premier.

Treasury Solicitor, the legal adviser to the government departments. He defends actions brought against ministers or certain other public functionaries. He deals with such intestate estates as escheat (*q.v.*) to the crown. He is generally a qualified barrister. As to his duties in his capacity of King's Proctor, *see* under that title.

Treating, *see* ELECTIONS—*Corrupt and illegal practices at elections.*

Treaty. The T.-making power is the prerogative of the crown (*q.v.*), as is the power to conclude peace. The negotiations for a T. are begun by send-

ing to the minister representing the crown in the country with whom the T. is to be made an instrument under the Great Seal (*see* SEAL) containing the authorisation to sign a T. The T. itself usually contains a clause providing for its ratification by both sides, and until the ratifications are exchanged neither party is bound by the T. The crown in theory is the sole T.-making power in England, but according to Sir William Anson a T. which lays a pecuniary burden on the people, or which alters the law, requires parliamentary sanction. Further, Ts. which involve the cession of territory, or confer immunities on foreigners, or affect the rights of the private individual are probably only conditional on the approval of parliament as confirmed by an Act. But it seems an open question whether in the case of territory acquired by conquest or cession the crown has unlimited power to cede such territory by T.

Trebbia, or **Trebia**, a riv. of ancient Italy, noted for the victory gained on its banks over the Romans by Hannibal in 218 B.C. It rises in Liguria in the Apennines, and flows in a N.E. direction through Emilia, joining the Po above Piacenza. Length 71 m.

Trebitsch, a tn. of Moravia, Austria, on the R. Iglawa. Manufs. cloth. Pop. 11,000.

Trebizond: 1. A vilayet of Turkey in Asia, extending along the shore of the Black Sea. Area 16,671 sq. m. Pop. 1,265,000. 2. The cap. of the above vilayet, is a port on the Black Sea, 108 m. N.W. of Erzerum, formerly of great importance as an emporium for the wares of Kurdistan and Persia. The town has strong fortifications and walls, but has lost much of its transit trade since the Batum-Tiflis railway was opened. The chief exports are hides, skins, eggs, opium, tobacco, and filbert nuts. Its silk industry is declining. T. was founded in 600 n.c. by Greek settlers from Sinope. In 1204 it was the capital of Trebizond, an empire constituted by Alexius Comnenus. It became Turkish in 1462. In 1895 it was the scene of the Armenian atrocities.

Treble, the highest part in three- or four-part vocal music, especially applied to boys' voices; the corresponding pitch in the female voice being known as *soprano*. Originally, the dominant part of harmonised song was the lowest; a higher part was known as *alto*, and one still higher was called T.

Trebonius, Gaius (*d.* 43 n.c.), was the promoter of the *Lex Trebonia*, proposing Pompey for the two Spains,

Crassus for Syria, and Cæsar for the Gauls and Illyricum. He was governor in Further Spain in 47 as proprætor, but was expelled from the province by a mutiny of the soldiers. In 45 he was raised to the consulship by Cæsar, but in spite of this was one of the prime movers in the conspiracy to assassinate him. He was slain by Dolabella in 43 B.C.

Tredegar, a tn. of Monmouthshire, England, 17 m. N.W. of Newport. The chief industry is coal mining. Pop. (1911) 23,604.

Tredgold, Thomas (1788-1829), born at Brandon, near Durham. He was apprenticed to a carpenter and worked for five years at the trade. He then removed to London and obtained employment in the office of an architect. While here he wrote many scientific works. Of these the following are the principal: *Elements*

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Railroads and Carriages, 1825; *Remarks on Steam Navigation, etc.*, 1825. The last important work published by T. was *The Steam-Engine*, 1827 and 1838.

Tree, a perennial plant with a woody stem and branches differing only in size from a shrub. In palms and other trees the terminal bud of the primary stem is the only one to develop, and thus a long, unbranched trunk is formed. Ts. do not often exceed 100 ft. in height in Britain, but the sequoias or redwoods of California are known sometimes to exceed 300 ft.—the greatest authentic height is 325 ft.—and *Eucalyptus amygdalina* of S. Australia grows to about 280 ft.

Tree, Sir Herbert Beerbohm (b. 1853), an actor manager, born in London. He made his first appearance on the stage in 1877, and ten years later became manager of the Haymarket Theatre. He is now proprietor and manager of His Majesty's Theatre. He is recognised as the leader in his profession, and is especially famous for his productions of Shakespeare's plays. He has published lectures on *The Imaginative Faculty*, and on *Hamlet from an Actor's Prompt Book*, *Henry VIII. and his Court*, etc. His *Thoughts and Afterthoughts* were

Tree-fero, a fern rhizome, somewhat in structure. Many Ts. belong to the genus *Cyathea*.

Tree-frog, a name given to members of the family Hylidæ. They are widely distributed, especially in America, but absent from Britain.

The European T. (*Hyla arborea*) is bright leaf green above and white underneath, and possesses some powers of colour change. The male has a tinge of brown on the throat. The digits bear adhesive discs, with which it readily climbs even up grass. The male croaks loudly, especially on the approach of rain. They are very active insect hunters, and are often kept in fern cases and greenhouses.

Tree-nettle, see NETTLE-TREE.
Tree-worship, in some form or other, seems to be universal. In Europe, the veneration of trees as sacred objects or the habitat of deities continued to a late date, and we find records of it in many of the accounts of the early Christian missionaries in the N. The veneration of the sacred oak was a leading feature of the Prussian religion, and all know that the same tree and its parasite

the mistletoe were venerated by the Britons. In Lithuania this of worship continued down to 14th century. T. falls into two ions. In the more primitive form the tree is itself considered as an animate being. In the later and more common form it is considered as the residence of a being which can detach itself at will, but whose fortunes are sometimes bound up with those of the tree. See Frazer's *Golden Bough* (2nd ed.), 1900, and article by S. A. Cooke in *Ency. Brit.*

Trefoil, the name given to various three-leaved plants. More than twenty British species belong to the genus *Trifolium*. Bird's-foot Ts. are included in the genus *Lotus*.

Trefouret, Jeanne Alfredine, see HADING, JANE.

Tregelles, Samuel Prideaux (1813-75), an English New Testament scholar, born at Falmouth. His chief work was a Greek New Testament (1857-79). He also published other works on the same lines, and edited Hebrew and Greek dictionaries.

Tréguier, a tn. in the dept. of Côtes-du-Nord, France, at the junction of the Guindy and Jaudy rivers. Pop. 3300.

Treinta y Tres, the cap. of the dept. of the same name, Uruguay, 150 m. N.E. of Montevideo. Pop. 4000.

Treitschke, Heinrich Gotthard von (1834-96), a German historian and publicist, author of the *History of Germany in the 19th Century*. As a

young man he allied himself with the of progress, but as he grew his political views became reactionary. For many years he sat in the Reichstag. He was latterly a strong advocate of Pan-Germanic doctrines, and a patriot of a very uncompromising character. His collected writings were published at

Leipzig in 1907. Mr. Hyndman has translated one of his pamphlets.

Trelawney, Sir Jonathan (1650-1721), an English divine, held successively the bishoprics of Bristol, Exeter, and Winchester. In 1688 he was numbered among the seven bishops tried under James II. for refusing to conform to the Declaration of Indulgence, but was acquitted. He is the hero of R. S. Hawker's ballad, *And shall Trelawney Die?*

Trelawny, Edward John (1792-1881), an English traveller and man of letters; met Shelley and Byron in Italy in 1822, and was present when the former was drowned. In 1858 he published his *Records of Shelley, Byron, and the Author*. He took part in the Greek struggle for independence in 1823. He survived until his ninetieth year.

Tremadoc Slates are dark earthy slates, and form the top beds of the Upper Cambrian system.

Trematodes, a class of flat worms, with an oval non-segmented body. Many of them are parasitic, and among the most important are *Distomum hepaticum* and *D. lanceolatum*, which cause liver fluke (*q.v.*) in sheep and other ungulates. Among other important parasites T. are *Amphistomum Collinsii* and *Gastrodiscus Aegyptiacus*, both of which infest the intestines of horses, and *Bilharzia crassa*, a blood parasite of cattle and occasionally of man in the tropics.

Tremiti, a group of islands in the Adriatic Sea, belonging to the province of Foggia, Italy. San Nicola, San Domino, and Caprara are the chief ones.

Tremelle, Charlotte de la (1599-1664), Countess of Derby, a daughter of the Due de Thouars, and was married in 1626 to the Earl of Derby. In 1644 she held Lathom House in Lancashire for three months against a besieging force of Roundheads. See *Colonel Hutchinson's Memoirs*.

Tremelite, see AMPHIBOLE.

Trench, a military work which can be used either for defensive or offensive works. In the case of sieges, Ts. may be thrown up either to defend the fortress or town, or to give cover to the attacking force by means of which they can approach nearer to the town or fortress.

Trench, Friedrich von der, Baron (1726-94), a Prussian officer; when only sixteen years of age he became a cadet in the bodyguard of Frederick the Great. He was soon promoted, and distinguished himself in a campaign against Austria; but his intrigue with Princess Amelia of Prussia led to his imprisonment in the citadel of Glatz in 1745. He, however, effected

his escape and entered the Russian service. In 1745 he was again arrested and imprisoned in the fortress of Magdeburg, and was only set at liberty in 1763. He afterwards published *Sämmtliche Gedichte und Schriften und Merkwürdige Lebensbeschreibung*. T. was ultimately guillotined.

Trench, Richard Chenevix (1807-86), an Anglican archbishop and poet, born at Dublin. He was professor of divinity at King's College, London (1847-58), dean of Westminster (1856), where he instituted evening nave services, and archbishop of Dublin (1863). His poems show him to have been a gifted disciple of Wordsworth; and *The Study of Words* established his reputation as a philologist. He also published *Notes on the Parables of our Lord* and *Notes on the Miracles of our Lord*; and it was he who gave the first impulse to the great Oxford *New English Dictionary*.

Trendelenburg, Friedrich Adolf (1802-72), a German philosopher, born at Eutin, near Lübeck, and educated at Kiel, Leipzig, and Berlin universities, being professor at the last-named from 1833 till his death. Chief work, *Naturrecht*; also published *Elementa logicae Aristotelicae*, *Logische Untersuchungen*, etc. See *Lives* by Bonitz (1872) and Kleinert (1872).

Trengganu, a state of the Malay Peninsula, having on the N. the China Sea and on the W. Kelantan. It was ceded by Siam to Britain in 1909. Its chief industry is fishing, and it has also tin mines. The capital is Trengganu, with a pop. of about 15,000. Area of state, 6000 sq. m. Pop. 146,920.

Trent, the third most important riv. of England, rising in Staffordshire and flowing through the counties of Derby, Lincoln, and

Use to form the Humber. It is about 170 m. long, and is connected with other rivers by canals. The chief towns on its banks are Nottingham, Newark, and Burton-on-Trent. The chief tributaries are the Idle, Tame, Dove, Derwent, and Sow.

Trent, a tn. of the Tyrol, Austria; stands in a beautiful situation on the Adige, 25 m. N.W. of Venice. T., the ancient *Tridentum*, has embattled walls, and a large ruined eastio. It is the seat of a bishop and has a splendid marble cathedral. In its former church of Sta. Maria Maggiore the famous Council of T. sat (1545-63). T. is noted for its manufactures of silk, pottery, and of the salami sausage. There are marble quarries near. Pop. 30,001.

Trent Affair, occurred during the

American Civil War in 1861. Captain Charles Wilkes intercepted the British steamer *Trent* on its way from Havana to St. Thomas and carried off two Confederate commissioners, Messrs. Mason and Slidell. They were taken to Boston and imprisoned in Fort Warren, but released in 1862 on the demand of the British government.

Trente-et-Quarante, *see* GAMBLING.

Trenton: 1. The cap. of New Jersey, U.S.A., on the Delaware R., 33 m. N.E. of Philadelphia. It is an important industrial centre, especially for pottery, but iron, steel and copper wire, rope, cables, rods, plumbers' supplies, and all kinds of machinery are also manufactured. Pop. (1910) 96,815. 2. A city and co. seat of Grundy co., Missouri, U.S.A., on the Grand R. It is a trading centre for a prosperous farming region. Pop. (1910) 5656. 3. A tn. and port of entry in Hastings co., Canada, on Trent R. It has an extensive export of timber, and large manufacturing industries. Pop. about 5000.

Trenton Falls, a summer resort in Oneida co., New York, U.S.A., noted for its scenery, named from the falls, which consist of six cataracts with a total descent in 2 m. of 312 ft.

Trepang, *see* BECHE DE MER.

Trephine, or Trepan, an instrument with a circular saw edge, adapted for cutting and removing a piece of bone from the skull. The operation of trephining is called for when a portion of the brain is compressed through fracture or other injury; or when a tumour or abscess needs to be removed.

Trepoff, Dmitri Feodorovitch (1855-1906), a Russian general, entered the army in 1872. He took part in the campaign against Turkey in 1877, and was wounded, and in 1895 was raised to the rank of colonel. But having had a quarrel with the Grand Duke Nicolas, then at the head of the cavalry, he had to leave the army. He was afterwards placed at the head of the police force in Moscow (1896) by the Grand Duke Sergius, then governor-general of that town, and raised to the rank of major-general in 1900. He resigned, however, in 1904, and in the following year was appointed governor-general of St. Petersburg, when he did much to put down the disturbances then rife in the capital.

Treport, Le, a seaport in the dept. of Seine-Inférieure, Franco, 16 m. E.N.E. of Dieppe. The chief export is sugar. Pop. 5000.

Trespass, in a wide sense, denotes any transgression (not amounting to a felony) whether it relates to person or property. Hence striking another, and detaining another's goods, con-

stitute T., as also default in the performance of a contract, and any misfeasance which results in loss or damage to another. In a narrower and more popular sense it denotes an unauthorised entry on another man's land, though in law no T. is committed unless there is some damage *however inconsiderable or even technical* (e.g., 'bruising the grass' was the customary allegation in a writ of T. for 'breaking a close'). But technically the highly-complicated notion of T. connotes essentially 'adverse contact' whether to person or property. This kind of T. in the language of old pleadings (*q.v.*) was called T. *vi et armis* (by force and arms) (*see also* KING'S BENCH DIVISION). If the notion of T. had stopped here, its meaning would have been certain; but the common law extended it so as to embrace acts not involving contact, and not *per se* immediately injurious, but only injurious *by consequence and collaterally*. This was called *special trespass*, or *trespass on the case*.

Tres Tabernæ ('Three Taverns'), a vil. and post station of Latium on the Via Appia. Here St. Paul's friends came to meet him on his journey to Rome.

Treuen, a tn. of Saxony, 5 m. W.N.W. of Auerbach. *Manufs.* cotton and woollen goods. Pop. 8222.

Trevelyan, Sir Charles Edward, K.C.B. (1807-86), an Anglo-Indian official and organiser; went to India in the service of the East India Company in 1827, and was concerned in Indian finance and government till his retirement in 1865. He published several works on educational, political, and religious subjects.

Trevelyan, Sir George Otto, second Baronet (b. 1838), the only son of Sir Charles Edward T. and Hannah Moore, the sister of the great Lord Macaulay; born at Rothley Temple, in Leicestershire. He was educated at Harrow and Trinity College, Cambridge. In 1865 he entered Parliament as Liberal representative of Tynemouth. In 1868 he was returned for Hawick Burghs, and in 1887 for Glasgow.

Lord of the
Secretary of the
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for Ireland, in 1884 Chancellor of the Duchy of Lancaster and member of the cabinet, in 1886 and again in 1892 Secretary for Scotland. In 1897 he retired from public life. He has published a number of works dealing with historical and general subjects.

Trèves (Ger. *Trier*), a city in the Rhine prov. of Prussia, 48 m. from Metz, on the Moselle, situated in a fertile valley shut in by vine-clad

hills. It was formerly the cap. of an archbishopric and electorate of the empire, and is now the seat of a Roman Catholic bishop. It contains more important Roman remains than any other place in Northern Europe, notably the picturesque ruins of the Imperial Palace; the Porta Nigra, or Roman gate, part of the ancient defences of the town; the basilica or Palace of Constantine, now an evangelical church; baths, and an amphitheatre. T. has trade in vines, and manufs. machinery. Other industries are tanning, dyeing, and iron-founding. T. claims to be the oldest town in the German empire. It was important as early as the 1st century, and during the 3rd and 4th centuries was frequently the residence of the Roman emperors.

Treves, Sir Frederick, Bart. (b. 1853), an English surgeon and author, born in Dorchester. He was Hunterian professor of anatomy and Wilson professor of pathology at the Royal College of Surgeons (1881-86), and consulting surgeon to the forces in S. Africa (1900). He performed the operation on the late King Edward for appendicitis in 1902, but has now retired. His works include: *Physical Education; System of Surgery; Manual of Operative Surgery; Surgical Applied Anatomy; German-English Dictionary of Medical Terms; Tale of a Fictitious Hospital*, 1900; *The Other Side of the Lantern*, 1905; *Highways and Byways in Dorset*, 1906; *Cradle of the Deep*, 1908; *Uganda for a Holiday*, 1910; *Through the Desolate Land*, 1912; *The Country of the Ring and the Book*, 1913.

Trevigi, or Treviso, Girolamo da (1508-44), an Italian painter, the son of Pietro Maria Pennacchi. He painted 'Virgin and Child with SS. Joseph, James, and Paul, and Patron,' now in the National Gallery.

Treviglio, a tn. in the prov. of Bergamo, Italy, 19 m. E.N.E. of Milan. The chief manufs. are silk and wool. Pop. (com.) 15,100.

Trevisa, John de (1326-1412), an English author, was a native of Cornwall. He translated for the fourth Baron Berkeley, Higden's *Polychronicon*, 1387; Glanville's *De Proprietatibus Rerum*, and other Latin works.

Trevisani, Francesco, Cavaliere (1656-1746), was born at Capo d'Istria, near Trieste. He became the scholar of Antonio Sanello at Venice. After some preliminary practice as a painter in the Flemish school he distinguished himself by several fine pictures. At Rome T. found a valuable patron in the Cardinal Flavio Chigi. His chief excellence consisted in purity and brilliancy of colouring.

Treviso, the cap. of the prov. of Treviso, Italy, is seated on the Sile at its junction with the Piavesella, 18 m. N.W. by N. of Venice. Its cathedral, dating from the 12th century, contains paintings by Veronese and Titian. It is a bishop's see. Pop. 35,000.

Trevithick, Richard (1771-1833), an English engineer, was born in Cornwall. He was one of the greatest inventors that ever lived, and after preliminary experiments completed the first stean carriage to carry passengers at Redruth, 1801. The development of the high-pressure engine was also largely due to his inventions.

Trevor, Sir John (1633-1717), born in Denbighshire. He was recommended by Jefferys to be of the king's council, and master of the rolls in 1685. In May 1685, and again in March 1690, he was elected Speaker of the House of Commons. In the beginning of 1688 he was made a privy councillor. He was expelled from the House for accepting a bribe from the City of London. He, however, retained the mastership of the rolls.

Trew, Christoph Jacob (1695-1769), a German physician and botanist; published *Vasa Nutritia Foliorum Arbercorum*, 1748; *Herbarium Blackwellianum Auctum*, 1750-60; *Librorum Botanicorum Catalogus*, 1752-57.

Trial. Ts. of civil actions in England respecting common law matters (i.e., generally speaking, breaches of contract and torts, see TORT) if tried in the High Court may be either before a judge and jury or by consent before a judge alone. Actions in the commercial list are tried before a judge alone (see COMMERCIAL COURT). Actions involving accounts are assigned for T. before one of the three official referees. Actions touching matters of equity (q.v.) are tried exclusively before judges only; similarly in the case of bankruptcy matters. Admiralty causes are tried before a judge of the Probate, Divorce, and Admiralty Division with or without the aid of nautical assessors (see EVIDENCE). Divorce petitions, if undefended, are disposed of by a judge alone; if defended may or may not be tried before a jury. Plaintiff in an action must after delivery of pleadings (q.v.) give at least 10 days' notice of T. unless defendant agrees or has been ordered to accept short notice. If he does not give notice within six weeks after the close of pleadings, the defendant may himself do so, or apply to a master of the High Court to dismiss the action. If the action be for trial at assizes, the notice must be entered either at the

district registry of the assize town or with the associate of the circuit. In every action in every division of the High Court the place of T. is fixed by a master, who will endeavour to fix a place which will suit the convenience and pockets of both parties and the majority of the witnesses. The master also has power to direct the mode of T., but in certain cases the parties have a right to demand T. by jury, namely, in actions of libel, slander, seduction, breach of promise, false imprisonment (*q.v.*), malicious prosecution (*q.v.*). In cases where the parties have no such right, the party who desires a jury should within ten days after delivery of notice of T. apply for an order at chambers to have a jury. If neither applies, the master can make what order he deems fit. County court actions may be tried before a judge and jury of eight men, or before a judge alone (*see* COUNTY COURT, INFERIOR COURT). The right to begin at a trial depends upon the mode of raising the issues on the pleadings so far as actions for debt or liquidated (*i.e.*, certain or fixed) damages are concerned. The plaintiff will ordinarily begin in order to substantiate his affirmative pleas, but the defendant may gain the right if his defence contains none but affirmative pleas. In actions for unliquidated

(which, generally speaking, all those in which parties can a jury as of right) the plaintiff is always entitled to begin irrespective of whether the burden of proof lies upon the defendant. The right is a formidable one in a jury action, as the 'last word' (unless the other party calls no witnesses) rests with him who begins. It is a right of no great value where the judge sits alone. For the rules of evidence at a T. and the difference between examination-in-chief, cross-examination, and re-examination, *see* under EVIDENCE, EXAMINATION, and LEADING QUESTION. An application for a new trial may be made on several grounds: *e.g.* misdirection by judge, misapprehension of evidence, jury, excessive direction, &c. Application is made to the Court of Appeal within eight days after the T. Criminal Ts. in England at assizes (including the Central Criminal Court) and quarter sessions are held before a judge and jury. Petty offences are tried before a bench of justices of the peace or a stipendiary magistrate.

Trial by Combat, or Wager of Battle. This mode of trial, which was introduced into England by the Conqueror, was resorted to in civil actions, 'appeals' of felony, and

cases before the Court of Chivalry. In civil cases, to avoid the possible loss of one of the parties, the duel was fought by hired champions, but in military cases the parties themselves fought until one was slain or gave in (when he was put to death) unless the king intervened. Where the blood relations of a murdered person 'appealed' (meaning in this sense accused) the supposed murderer, the latter, where the accuser was not a woman, child, priest, or infirm person, could claim T. by C. with his accuser. The accused was hanged if vanquished, but if he killed his accuser or prolonged the fight from sunrise till dark he was acquitted. Owing to the principle of English jurisprudence that no law can be abrogated by mere desuetude, one Abraham Thornton accused of murder in 1817 revived this archaism of chivalry and challenged his accuser to T. by C. The 'appellant' declined, and Thornton had perforce to be discharged. T. by C. was then hastily abolished by statute.

Triangulum, a constellation between Perseus and Andromeda. β , magnitude 3.0, is the brightest member; 13 is double; R, a variable with a period of 268 days, changes from 7.3 to 11.4. There is also a nebula, 30' diameter, Messier, 33.

short-period variables; δ is double.

Triassic System, in geology, is the first of the three rock systems of the Mesozoic period. It constituted the upper half of the original New Red Sandstone before the elimination of the lower half as the Permian (*q.v.*) or Dyassic system. The system shows three distinct lithological types, viz.: (1) The marine facies of the Alpine Trias; (2) the semi-marine and semi-continental facies of the German Trias; and (3) the continental facies of Great Britain, S. Africa, etc. The three members of the original German T. system were named Bunter or variegated sandstones, Muschelkalk or shaly limestone, and the Keuper or red beds. In Britain, only two

members of the series are developed, the Bunter and the Keuper, and the system attains its greatest development in Cheshire and Warwickshire (about 2000 ft. thick). The Bunter or Lower Trias is made up of the Upper and Lower variegated sandstones with the intermediate pebbly beds, and the Keuper or Upper Trias consists of the Keuper marls and waterstones. The Bunter and Keuper are practically barren of fossils, but the latter affords beds of gypsum

and rock salt as well as building stone. A large part of Germany is occupied by Triassic rocks, the Bunter affording beds of dolomite and the Keuper local seams of coal (Lettenkohl) and beds of gypsum. The middle member of the German Trias—the Muschelkalk—is very rich in fossils. The British and German Trias were probably laid down in irregular basins, and the Muschelkalk of Germany must have been formed when the waters of the German basin were in communication with the open sea. The grand development of the marine facies of the Triassic in the E. Alps consists of thick bedded limestones, dolomites, and calcareous shales. The system here is generally divided into four subdivisions, viz. the Alpine Bunter, the Alpine Muschelkalk, the Norian, and the Carinthian, none of which can be individually correlated with the German types, although the range in time is equivalent. The transition beds between the Trias and the Lias (the Alpine Rhætic beds) can be paralleled with the Rhætic or Penarth beds of Britain. These beds are very fossiliferous, and are sometimes designated 'Atriclea Contorta' beds. The Alpine or marine type of Trias recurs in the Balkans, Apennines, Peru, Himalayas, Alaska, and Japan. The continental type of Triassic occurs in S. India, S. Africa, and in parts of N. America. The life of Triassic time was rich and varied. The animals include fishes (Dipnoids), amphibia, and all classes of reptiles. Pterosaurs, conifers, and cycads represented the plant life of the time, and the invertebrates embrace all classes. Lamellibranchs, gastropods, cephalopods, and crinoids were most abundant, and the Muschelkalk is rich in their remains.

Tribolo, Niccolò (1500-50), an Italian sculptor, born at Florence. He was employed at Rome, Loreto, and Florence, but his best work was the execution of twelve bas-reliefs for the doors of San Petronia at Bologna.

Tribonianus (d. 515), a Byzantine jurist and official, born in Paphlagonia about the end of the 5th century. He superintended the compilation of the *Pandects*, *Institutes*, and new code of Justinian.

Tribune (Lat. *tribunus*), the name given to officers of various descriptions in the constitution of ancient Rome. Of these the most important were the *tribuni plebis*, or Ts. of the commons. At first their power was small and they were only two in number, but soon they became formidable and not only preserved the rights of the people, but could summon assemblies, propose laws, stop the consultations of the senate, and even

abolish its decrees by their veto. Their consent was also necessary for the confirmation of the *senatus consultum*, and if any irregularity happened in the state their power was almost absolute, for they could even imprison a consul if he acted so as to disturb the peace of Rome. Again, their persons were held sacred, and to interrupt them while speaking was a punishable offence, while to strike them was a crime. But their power was undermined by Sulla. Pompey and Cotta, however, restored their privileges, and the office remained in full force until the time of Augustus, who conferred the power and office upon himself to make himself more absolute. It was totally abolished by Constantine. The fixed number of Ts. was ten. Amongst other officers bearing the title were: 1. The *tribuni militum*, who commanded a division of the legions. 2. The *tribuni cohortium praetoriarum*, who were entrusted with the person of the emperor. 3. The *tribuni aerarii*, who kept the money to defray the expenses of the army. They were abolished by Julius Caesar, but re-established by Augustus, who added to their number. 4. The *tribuni voluptatum*, who had charge of the amusements which were prepared for the people.

Trichinopoly: 1. A dist. of Madras, India, with an area of 3651 sq. m. and a pop. of 1,450,000. 2. Cap. of the above dist., 30 m. W. of Tanjore, stands on the Cauvery R. It is a fortified tn., encircled by walls, and its inhabitants (105,000) are noted for their manufacture of jewellery, cutlery, and cigars.

Trichinosis, or Trichiniasis, a disease caused by the presence of the parasitic nematode *Trichina spiralis*, which is found chiefly in man, the pig, and the rat, but also in the dog, cat, rabbit, etc. The parasite finds its way into man from infected pork which has not been properly cooked. The young forms are found encysted in the muscular fibres of the pig, and when the cysts reach the intestines, the solution of the calcified capsule sets free the parasites, which grow rapidly and reproduce in enormous numbers. The young trichinae then develop and bore through the intestinal walls, ultimately reaching the muscles, where they become encysted by the secretion of lime salts. They are then quiescent, and can only further develop by reaching the intestines of another host. The acute symptoms of the disease are caused by the migration of the trichinae from the intestines. The early indications are nausea, fever, and loss of appetite; later on exhausting diar-

rheca may occur, together with delirium, swollen eyelids, and tenderness and pain in the muscles. The most decisive symptom is a pronounced eosinophilia. It includes purgatives made in this expedient is contra-indicated, as all efforts must be directed towards avoiding exhausting the patient.

Trichomanes, or **Bristle Ferns**, a genus of ferns many of which are very beautiful. *T. radicans* occurs in Ireland.

Tri-chromatic Printing, see **PRINTING** and **PROCESS WORK**.

Triclinium, a Roman word used to designate the company disposed on the three couches that were usually placed at table for the guests; each of these couches was so made as to seat three persons. The word was used in this sense as a figure of speech, but it also more directly meant the room itself in which banquets were held, and the table and three surrounding couches. The houses of rich Romans were fitted with several *triclinia* to be used according to the different seasons of the year.

Tricolor, see **FLAG**.

Tricoupis, **Spiridon** (1788-1873), a Greek author and statesman, studied in Paris and London, and became secretary to Lord Guilford in the Ionian Isles. During the Greek War of Independence he occupied various important positions, and in 1832 was minister of foreign affairs. He was thirco envoy-extraordinary to London, and in 1850 was minister to Paris. He was a friend of Byron, whose funeral oration he pronounced. His chief work was his *History of the Greek Revolution*, 1853-57. His son, *Charilaos Tricoupis* (1832-96), became a foreign minister at the age of thirty-four, and prime minister 1886-90 and 1891-93. His policy was to develop the resources of his country so as to create an army and a fleet, but unfortunately the circumstances of the time did not allow his schemes to be carried into effect. He was the foremost Greek statesman of his time.

Tricuspid, see **HEART**.

Tricycle, see **CYCLES** AND

Tridacna Gigas, see **CLAM**.

Trident, in classic myth

used as the symbol of sovereignty over the sea. It consisted of three sharp points and three sharp barbs at the point where they meet with the T. on ancient coins, such as those of Saguutum, and on the Sicilian coins of Hiero. Britannia carries a T. also to represent sovereignty over the sea.

Triennial Acts. The object of these

Acts, passed in 1641 and 1694, was to ensure the frequent meeting of parliament. Charles I ruled for eleven years without summoning a parliament; the result was that the Long Parliament passed the first Triennial Act, 1641, empowering the Chancellor, or in default the Peers, to issue the necessary writs, if the king failed to call a parliament for three years, or in the last resort, allowing the electors to proceed to choose their representatives. The Act was repealed in 1664 by an Act which provided that parliament must not be intermitted for more than three years. In 1694 William III. assented to the second Triennial Act, which followed upon the declaration in the Bill of Rights that 'parliament ought to be held frequently.' In 1716 the triennial limit was increased to seven years. That period was reduced recently to five years by the Parliament Act, 1911.

Trier, see **TRÈVES**.

Trierarch, the captain of a trireme, or warship, among the ancient Greeks. At the time of the Peloponnesian War the state furnished the hull of the ship (*ναῦκεράν*) and the pay of the crews, but the equipment of the ships was at the cost of the Ts., who also gave *ἐπιδοπαί*, or additional pay, to secure the best men.

Trieste (ancient *Tergete*), the principal seaport of Austria-Hungary, situated on the Gulf of T., 70 m. E.N.E. of Venice. It consists of a new town and an old town. The Via del Corso separates the two portions of the city, which is also intersected by the Maria Theresa Canal. The city is the see of a bishop, and the principal trading port of the country, being the seat of the Austrian Lloyd Steamship Company, one of the largest in the world. The principal manufactures are leather, wax, and soap, whilst shipbuilding and iron-founding are carried on. The principal articles of export are wool and woollen goods, sugar, paper, machinery, etc., and the imports include cotton and cotton goods, coffee, coal, hides, fruit, corals, and tobacco. The harbour is a fine one, and in 1910 was developed and extended. T.

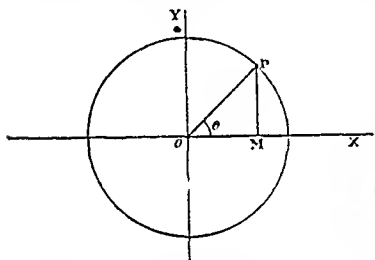
was a Roman colony of the time of Augustus, and in the 14th century it was the seat of the Venetian government. It was submitted to the Austrian suzerainty in 1382. From 1797-1805 it was held by the French, and from 1809-13 was part of the Illyrian provinces. T. was proclaimed an imperial city in 1849.

Trifolium, a genus of leguminous plants which includes some of the most valuable fodder plants, collectively known as clover (*q.v.*)

Triforium, in Gothic architecture, the space between the top of the vaulting and the clerestory windows, when opened into the nave by a number of arches, three or less in each bay.

Triglyph, in Greek Doric architecture, the upright blocks of the frieze, carrying the cornice above. Between the Ts. are the metopes (*q.v.*).

Trigonometry, in its primary meaning, signifies the measurement of triangles, but now it has a wider scope, embracing all types of geometrical and algebraical investigations by means of certain quantities termed trigonometrical ratios. These ratios are defined as follows: Take any system, of rectangular axes OX, OY , and with centre O describe a circle of any radius. On its circumference take any point P . Join OP , draw PM perpendicular to OX . Then



clearly the co-ordinates of P are (OM, MP) , or in ordinary cartesian notation (x, y) , where $x = OM, y = MP$. If the angle POM be denoted by θ , then $\sin \theta = \frac{MP}{OP}$, $\cos \theta = \frac{OM}{OP}$, $\tan \theta = \frac{MP}{OM}$, $\operatorname{cosec} \theta = \frac{OP}{MP}$, $\sec \theta = \frac{OP}{OM}$, $\cot \theta = \frac{OM}{MP}$. The terms \sin, \cos, θ , etc., are abbreviations for sine, cosine, tangent, cosecant, secant, and cotangent.

From the above definitions the following relations hold: $\sin \theta = \frac{1}{\operatorname{cosec} \theta}$, $\cos \theta = \frac{1}{\sec \theta}$, $\tan \theta = \frac{1}{\cot \theta}$. Also since OMP is a right-angled triangle, $MP^2 + OM^2 = OP^2 \therefore \left(\frac{MP}{OP}\right)^2 + \left(\frac{OM}{OP}\right)^2 = 1$, i.e. $\sin^2 \theta + \cos^2 \theta = 1$. From these other relations, such as $\sec^2 \theta = 1 + \tan^2 \theta$ and $\operatorname{cosec}^2 \theta = 1 + \cot^2 \theta$, may be deduced. As the line OP revolves the angle θ increases from 0° to 90° , 90° to 180° , 180° to 270° , 270° to 360° , and then moves through the same positions as before. In the construction of tables for the values of the different trigonometrical ratios of θ , the labour of finding these values is

greatly minimised by the use of the following relations, it being only necessary to calculate these values as θ takes the various values from 0° to 45° . These relations may easily be proved by reference to diagram, $\sin(90 - \theta) = \cos \theta$, $\cos(90 - \theta) = \sin \theta$, $\tan(90 - \theta) = \cot \theta$. The following

also may easily be deduced: $\sin(90 + \theta) = \cos \theta$, $\cos(90 + \theta) = -\sin \theta$; $\sin(180 - \theta) = \sin \theta$; $\cos(180 - \theta) = -\cos \theta$. Thus $\cos 170 = \cos(90 + 80) = -\sin 80 = -\sin(90 - 10) = -\cos 10$. The addition theorem is useful in finding the values of the ratios of the sum or difference of two angles, the value of the ratios of these angles being known. The theorems are as follows, θ and ϕ denoting the angles:

$$\sin(\theta + \phi) = \sin \theta \cos \phi + \cos \theta \sin \phi, \\ \cos(\theta \pm \phi) = \cos \theta \cos \phi \mp \sin \theta \sin \phi.$$

Often an angle is denoted by its trigonometrical ratio, this value is called the inverse function, e.g. $\sin^{-1} \frac{1}{2}$ is the angle whose sine is $\frac{1}{2}$, $\cos^{-1} \frac{1}{2}$ is the angle whose cosine is $\frac{1}{2}$. For the construction of tables, the sine and cosine functions are expanded into the following series: $\sin \theta = \theta - \frac{\theta^3}{6} + \frac{\theta^5}{120} - \dots$

$$\dots \text{ad inf.}, \cos \theta = 1 - \frac{\theta^2}{2} + \frac{\theta^4}{24} - \dots$$

ad inf. , where θ is measured in radians. Thus if θ° is value of the angle in

degrees, the number of degrees $= \frac{\pi \theta}{180}$ radians. Trigonometry is applied to the solution of triangles. These triangles may be plane or spherical, the chief relations existing between the sides and the trigonometrical ratios of the angles are: $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$, $a^2 = b^2 + c^2 - 2bc \cos A$, etc.,

where A, B , and C denote the angles, and a, b, c the sides opposite to these angles. In spherical triangles $\frac{\sin A}{\sin a} = \frac{\sin B}{\sin b} = \frac{\sin C}{\sin c}$, $\cos a = \cos b \cos c + \sin b \sin c \cos A$; $\cos A = -\cos b \cos c + \sin b \sin c \cos a$, the A, B, C , and a, b, c having the same significance as before. The subject arose out of the study of astronomy, the Greek astronomer Hipparchus (160 B.C.) inventing it. The man who greatly extended the subject was Ptolemy, the Alexandrian astronomer. Regiomontanus made the subject a science quite independent of astronomy. See *Plane Trigonometry* by Todhunter (1897), Loney (1904); and M'Lelland, *Spherical Trigonometry*, 1896.

Trikkala, a tn. of Greece, cap. of the

prov. Trikkala, 38 m. S.W. of Larissa. It is a centre of trade in wheat, maize, tobacco, and cotton, and the see of an archbishop. Pop. 18,000.

Trillium, a genus of perennial plants (order Liliaceæ), with thick rhizomatous stems and roots, and a solitary nodding white, pink, or purple flower borne in the centre of a whorl of three leaves. *T. grandiflorum*, the wake robin, is often grown in gardens.

Trilogy, a group of three tragedies which are either connected by a common subject, or each is a distinct story. In Greece every one who took part in the poetic contest had to produce a T. and a satiric drama. The only surviving example is the *Oresteia* of Æschylus, consisting of the 'Agamemnon,' 'Choephore,' and 'Eumenides.'

Trim, the cap. of co. Meath, Ireland, on the R. Boyne, 28 m. N.W. of Dublin. Its chief points of interest are its ruined castle and abbey, and a monument to the Duke of Wellington, once a resident. Pop. (1911) 1488.

Trimmer, Sarah (1741-1810), an authoress, was a great favourite of Dr. Johnson, and published: *Easy Introduction to the Knowledge of Nature*, 1782; *Sacred History*, 1782-84; *The Economy of Charity*, 1786; *The Story of the Robins*, 1786; and *Fabulous Histories*, 1786.

Trimorphism, see DIMORPHISM.

Trimurti, the name of the Hindu triad, or the gods *Brahman*, *Vishnu*, and *Siva*, when thought of as an inseparable unity, though three in form. When represented, the T. is one body with three heads. The symbol of the T. is the mystical syllable *om*.

Trincmaleo, a seaport on the N.E. coast of Ceylon, with an excellent harbour. It is the site of the Temple of the Thousand Columns, a pilgrimage resort; reduced to ruins by the Portuguese during the 17th century. Pop. 13,000.

Tring, a tn. of Hertfordshire, England, 32 m. N.W. of London. Here are Tring Park and the Rothschild Museum. It is engaged in silk manuf. and straw-plaiting. Pop. (1911) 4481.

Trinidad: 1. The second largest W. Indian island belonging to Britain. It lies off the N.E. coast of Venezuela, from which it is separated by the Gulf of Paria. Area 1754 sq. m. The N.E. and S. coasts are steep and lofty, with few harbours, but on the V. the coast is low, and the Gulf of Paria forms a vast harbour. From the W. the land rises gradually towards the interior, with fertile plains, hills, and valleys. Three mountain ridges traverse the island from E. to W., which may be regarded as continuations of similar ranges in Venezuela, of which

T. originally formed part, until detached by some volcanic or aqueous convulsion. The climate is agreeably warm. The principal exports are sugar, cocoa, and asphalt; and cocoanut oil, rum, and Angostura bitters are manufactured. One of its features is Lago Brea, or the pitch lake, which contains an enormous supply of asphaltum. The island is drained by the Caroni, Oropuche (both navigable), Lebranche, Nariva, Gnacaro, and the Hortoire. Port of Spain is the capital. Discovered by Columbus in 1498, T. became British in 1797. Pop. 370,000, mostly coloured. 2. The cap. of Las Animas co., Colorado, U.S.A., engaged principally in coal-mining. Pop. (1910) 10,204. 3. A city on the S. coast of Cuba, 175 m. S.E. of Havana, exporting sugar and honey. Pop. 12,000. 4. A volcanic island off the coast of Brazil, to which it belongs.

Trinitarians, or **Redemptionists**, a religious order, founded in Rome in 1198 by John of Matha and Felix of Valois for the redemption of Christians captive among infidels. The order followed the rule of St. Augustine.

Trinité, La, a tn. on the island of Martinique, W. India; actively engaged in the shipping industry. Pop. (com.) 8000.

Trinity. In theology, the term used for the highest mystery of the Christian faith, the doctrine that the Divine Being consists of three persons united in one God. In the O.T. this doctrine cannot be said to hold a prominent place, for the Jews had to learn the unity of God as opposed to polytheism. Not even in the N.T. is the doctrine of the Blessed T. found in its fully-developed form. This development was the work of the early centuries, and its expression owes most of all to Greek thought. The

... was first discovered by the Nicene Creed and I believe in the Father part was added ... and now the expression ... pressor ... complo ... ever, is

... age, was ... nry VIII. ... lleges of ... 324) and ... It was founded for a master and sixty fellows, but the endowment was considerably increased by Queen Mary. There are numerous scholarships and exhibitions. See W. W. Rouse Ball's *Trinity College* (Dent).

Trinity College, Oxford, was origin-

ally founded and endowed by Edward III., Richard II., and the priors and bishops of Durham. At the Reformation it was suppressed, but a new college was founded in 1554-55 by Sir Thomas Pope. This is the present college. The original foundation was for a president, twelve fellows, and twelve scholars, these last to be chosen, if possible, from the founders' manors.

Trinity House, the name of five maritime societies, of which only one, the 'Corporation of Trinity House of Deptford Strond,' London, retains its ancient powers and privileges. The others, at Leith, Dundee, Hull, and Newcastle-on-Tyne, are now little more than benefit societies. The London House, however, still retains the management of some of the most important interests of the seamen and shipping of England. Its corporation consists of a master, deputy-master, and thirty-one elder brethren, two of whom sit as assistants to the judge in the Court of Admiralty in almost all cases where any question upon navigation is likely to arise. There is also an unlimited number of younger brethren.

Trinity Sunday, according to the Western calendars, the first Sunday after Pentecost. In certain medieval uses it was kept on the last Sunday after Pentecost.

Trinobantes, a British tribe who were seated N. of the Thames, having London for their capital. In 43 A.D. and 61 A.D. they were overthrown by the Romans.

Trio, a term in music for a composition for three voices or instruments. It is also applied to the secondary movement of a march or minuet, and many other kinds of dance music.

Tripe, the paunch and smaller reticulum of a ruminating animal (especially sheep and horned cattle) used as food.

Triple Alliances. The first was ratified between the States-General and England against France in 1668 for the protection of the Spanish Netherlands. It was afterwards joined by Sweden, thus forming a T. A. Another was arranged in 1717 between England, Holland, and France against Spain, but after the accession to it of Austria in 1718 it was known as the quadruple alliance. In 1788 England, Prussia, and Holland allied, and in 1795 England, Russia, and Austria. About 1833 an alliance was arranged between Germany, Austria, and Italy to check the power of Russia and France. Although this T. A. expired in 1892, it has since been renewed and extended for a number of years,

and this, together with the dual alliance between France and Russia and the triple entente between England, France, and Russia, in the main preserve the balance of power between the great nations of the world.

Tripoli, an Italian territory of Northern Africa, extending along the S. shores of the Mediterranean from 11° to 25° E., and stretching backwards some 800 m. into the Sahara Desert. The coastline is more than 1000 m. in length, but the greater part of it, especially to the W. of Cape Selarra, is low and sandy, and thus quite unfit for harbourage. About the middle occurs the Gulf of Sidra, at the E. entrance of which is the port of Benghazi. There are no rivers of importance. The Atlas Mt. range breaks into two ranges as it enters T., and these two, the Gharian and Suda ranges, run from W.N.W. to E.S.E. Besides these there are several minor ridges. Among the Gharian Mts. much corn and fruit is produced, though a considerable part of this tract is used as pastureland. The most barren district is that around the Gulf of Sidra, to the W. of which stretch endless marshes. The country E. of this gulf is known as Barea (anciently Barca) and is fertile and the W. District was extensively colonised by Moslems from Crete. T. is an entirely agricultural country, possessed of no minerals but salt. Along the coast all kinds of tropical fruit, palms, olives, etc., are produced. Further inland are grown cereals, olives, palms, saffron, figs, almonds, dates, lotus, and the vine. Senna, tobacco, henna, castor, and carob beans are also cultivated. Cattle and sheep are numerous, especially in Barea, where much more might be done in the way of stock-rearing. Before the abolition of the over-sea slave trade, the principal commerce was in negro slaves for the mainland of Turkey. The chief exports now consist of barley, esparto grass, cattle, ostrich feathers, ivory, sponges, and skins. Its chief imports are foodstuffs, cotton and metal goods.

Government.—During the 16th century T. came under Turkish rule, and in 1835 was made into a vilayet of the Ottoman empire. In Sept. 1911, however, Italy, which had long been dissatisfied with its relations with Turkey, issued an ultimatum, which was immediately followed by war. The town of T. was blockaded, and in the beginning of October the whole territory was annexed. This annexation was recognised at the Treaty of Ouchy in Oct. 1912. T. is now being administered under the Colonial

Ministry. Its area is estimated at 406,000 sq. m., and its pop. at somewhat over 500,000. The capital is Tripoli, situated on the bay of the same name. See H. M. de Mathuisieulx, *L'Égypte moderne et de l'Égypte ancienne*, 1912.

Tripoli, a tn. of Syria in the vilayet of Beyrut, about 2 m. from the sea. In 1109 it was taken by the Crusaders. Its pop. is about 30,000.

Tripoli Mineral, Infusorial Earth, or Kieselguhr, is composed almost entirely of the siliceous remains of diatoms. Wide areas of it are now being laid down as diatom-ooze on the bed of the S. Pacific. It occurs in Virginia, U.S.A., in a bed 40 ft. thick. As 'Tripoli powder' it is used for polishing purposes, and is also used in the manuf. of dynamite.

Tripoliza, the cap. of Greece, is seated in a plain at a height of 3000 ft. above sea-level. It was utterly destroyed by Ibrahim Pasha in 1825. Pop. 11,000.

Tripes, The, the final examination for the honours degree at Cambridge University. The name recalls the three-legged stool (Gk. *τρίπους*) on which an 'old bachelor' sat when the senior bachelor for the year propounded to him two questions.

Triptolemus was, according to Greek legend, the son of Celeus and Metaneira, who dwelt in Eleusis. In return for the loving kindness of Demeter, T. founded her native city, besides his husbandry.

Triptych (Gk. *τρίπτυχος*, threefold), a tablet, often used as an altar-piece, of three leaves, each painted, and so

war. As its name implies, it was provided either side with three banks of oars, *ζύγιοι*, had three short lowest tier. The crew numbered about 220, 174 of whom were oarsmen and 17 sailors.

Trisagion (from Gk. *tris*, thrice, and *agos*, holy), a doxology of the liturgy used in the Greek Church.

Trismegistus, see HERMETIC BOOKS, and THOTH.

Trissino, Giovanni Giorgio (1478-1549), an Italian poet, enjoyed the friendships of the Medici popes, Leo X. and Clement VII., who employed him on diplomatic missions

In grammar he established the difference between *u* and *v* and *i* and *j*, and in drama he wrote the first regular tragedy, *Sophonisba* (1515), an effort in blank verse. Moreover, he wrote an epic, *The Deliverance of Italy from the Goths* (1548), also in blank verse.

Tristan, or Tristram, the hero of an intensely romantic Celtic legend. The scene of the story, which deals with the tragic and fateful love story of T. and the two Iseults, Iseult of Ireland and Iseult of the fair hand, is laid in Ireland and Brittany, but chiefly in Cornwall at the court of King Mark. Modern versions of the tale are Wagner's opera *Tristan und Isolde*, Matthew Arnold's *Tristram and Iseult*, Swinburne's *Tristram of Lyonesse*, and 'The Last Tournament' in Tennyson's *Idylls of the King*.

Tristan da Cunha, the general name of three islands. Tristan (16 sq. m. in area), Inaccessible Is., and Nightingale Is. are S. Atlantic, 2000 m. W. of Good Hope. They are

populated in 1909 by 95 inhabitants. See K. M. Barrow's *Three Years in Tristan da Cunha*.

Tristan da Cunha (d. c. 1530), a Portuguese navigator, set out on a voyage of exploration with d'Albuquerque in 1506. Besides discovering the islands which bear his name (q.v.), he took possession of Socotra, and came home richly laden from an expedition against Calicut.

Tristram, see TRISTAN.

Triticum, a genus of grasses bearing cylindrical spikes. T. wheat (q.v.).

or Kniphofia, a genus of plants (order Liliaceae) with large grass-like leaves and tall spikes of red or yellow flowers. They are often grown in the garden, where in early autumn they are very brilliant and conspicuous. Some of the dwarf species are suitable for rock gardens.

Triton, dwelt, according to Greek legend, at the bottom of the sea with Poseidon and Amphitrite, his father and mother. He is represented as human to the waist and dolphin below, usually in the act of blowing a shell to calm the seas.

Triumph, the highest honour accorded to a victorious commander among the Romans. Only a dictator, consul, or praetor holding the imperium or highest command was entitled to it, and then

with necessary expenses was granted by the senate, who assembled outside the city to receive the victorious general, still in command. The celebration took the form of a processional

to the Capitol through the city; the streets were decorated with garlands, and the procession, headed by the senate and state officials, passed through crowds of spectators, who greeted it with cries of 'Io triumphe.' After the head came trumpeters, then the spoils and trophies, and the crowns presented to the general by provincial towns. Following these came the sacrificial bulls, captives in chains, victors, musicians, and priests. Immediately behind was the triumphal car, gilded, garlanded, and drawn by white horses; in this stood the general wearing the garb of the Capitoline Jupiter, the purple *tunica palmata*, and *toga picta*, the former decorated with palm shoots, the latter with golden stars. An ivory sceptre surmounted by a golden eagle was carried in the left, a branch of bay in the right hand. Over his head a slave held the golden crown of Jupiter. Then followed the soldiers. Arriving at the Capitol, solemn sacrifice was made, and general festivity followed in the city. When the senate refused to authorise a T., the general might undertake one on his own account to the temple of Jupiter Latiaris, or he might be granted an ovation (*q.v.*).

Triumviri were three magistrates who constituted themselves the supreme heads of the Roman republic. The first triumvirate, or board of triumvirs, was that of Julius Cæsar, Pompey, and Crassus (60 B.C.), and the second, and last, that of Augustus, Antony, and Lepidus (43 B.C.). There were also *triumviri nocturni*, a board of three night watchmen, and *triumviri capitales*, who administered the death sentence, etc.

Trivandrum, a tn. in Travancore state, Madras, India, 53 m. S.W. of Tinneveli. Its chief buildings include the Maharajah's palaces, a temple of Vishnu, and the Maharajah's college. Pop. 58,000.

Troas, see TROY.

Trocar (*fr. trois quarts*), a surgical instrument, triangular in section, and sharpened to a point. It is provided with a sleeve or cannula which fits closely round the sharpened portion. It is used for plunging into a cavity when it is required to draw off pus or other fluid, the stem being withdrawn so as to leave the cannula as a drainage tube.

Trochee, a metrical foot, which in the classical quantitative system consists of one long and one short syllable (- -), and in the English accentual system of one accented and one unaccented syllable (˘ -).

Trochidæ, a family of gasteropod molluscs, distinguished from the

closely allied family Turbinidæ by the horny operculum.

Trochilus, see HUMMING-BIRDS.

Trochoid, the curve traced by a fixed point in a circle which rolls on a straight line. If the fixed point is on the circumference, the resulting curve is a cycloid.

Trochu, Louis Jules (1815-96), a French general. He exposed in his brochure, entitled *L'Armée française en 1867*, the crying need of military reforms. As governor of Paris during the melancholy siege of 1870, he made the best of inadequate resources.

Troctolite, a variety of gabbro, composed of anorthite and dark-green olivine.

Troezen, a city of ancient Greece, situated near the coast towards the eastern extremity of Argolis. The modern name is Troezen, and here met a new National Assembly in 1827.

Troglodytes, a general Greek name for 'cave dwellers,' who were believed to dwell in the Caucasus and especially in Ethiopia, where they tended cattle and practised barbarous customs.

Trogus Pompeius, a Roman historian of Gaulish origin, who lived in Rome during the rule of Augustus. He wrote *Historia Philippica*, a history of the Macedonian empire down to the conquest by Rome of the East.

Troilus, in Greek legend, the son of Hecuba and Priam, King of Troy, and is variously represented as slain in battle or taken captive by Achilles. Classical story knows nothing of the tale of faithless love which Shakespeare unfolds in *Troilus and Cressida*.

Troitsk, a tn. in the gov. of Orenburg, Russia, 310 m. N.E. of Orenburg. It is an important trade centre. Pop. 23,500.

Troja, a tn. in Apulia, Italy, 14 m. W.S.W. of Foggia. Pop. 7000.

Troll, in Scandinavian folklore, a kind of evil spirit or wizard. The Norse sailors also called the Greenland aborigines Ts.

Trollhattan, a tn. in the prov. of Elfsborg, Sweden, 7 m. S. of Venersborg. The falls of Trollhättan, over 100 ft. high, afford water power for the surrounding factories. Pop. 7917.

Trollope. The family of T. has its place in the literary annals of England after Frances Milton (1780-1863) married Thomas Anthony T. in 1809. After a visit to America she wrote *Domestic Manners of the Americans* (1832), and numerous novels, including *The Vicar of Wrexhill* (1837), which had the honour of a caustic review by Thackeray, and *The Widow Barnaby*. One son of this marriage was Thomas Adolphus (1810-92),

a writer on many miscellaneous subjects, a journalist, and a novelist. Another, a more famous son, was Anthony (1815-82), who for many years was an official in the Post Office. His first work of fiction, *The Macdermots*, appeared in 1847.

His last was *The Warden*, the 12th volume of the Barsestshire series, which concluded with *The Last Chronicle of Barsest* (1867). The Barsestshire novels undoubtedly contain his best work. He published an *Autobiography* in 1875. A biography by T. H. S. Escott appeared in 1913.

Trombone, originally called the Sackbut, a brass wind instrument, which is in reality a trumpet of deep tone. It consists of a long tube, bent twice upon itself, the centre section of which is double, an inner tube sliding backwards and forwards within an outer one. By means of this every sound in the diatonic and chromatic scales within its compass is obtained in perfect tune. There are three kinds of T., the *alto*, the *tenor*, and the *bass*, and these in orchestral music are generally used together.

Tromometer, see SEISMOGRAPH.

Tromp, Cornelius van (1629-91), a Dutch admiral, a son of Martin H. T. With Opdam he shared in the defeat at Solebay (1665), but he had his revenge when in 1673 he held his own against the combined French and English fleets.

Tromp, Martin Harpertzoon (1597-1653), a Dutch admiral, defeated a Spanish squadron off Gravelines in 1639, and the same year captured thirteen richly-laden merchantmen from Portugal and Spain. But in this country his name is respected for the many lances he broke with Blake in 1652-53. In June 1653 he was worsted off the N. Foreland, and in July he received a mortal wound during a fierce struggle with Monk.

Tromsø, the cap. of the dist. of Tromsø, Norway, on an island of the same name. The chief occupation is fishing, particularly whaling. Pop. 7000.

Tron, or Trone, was a ponderous beam set up in the market-place of Scottish towns as a means of weighing heavy merchandise. A 'tron' lb. was in the early days worth 21 oz., but it was later equivalent to the standard 16 oz. The 'tron' system is now obsolete.

Trondhjem (ancient *Nidaros*, also *Thronthjem*, and Ger. *Drontheim*), the third commercial port in Norway, and former capital, lies at the mouth of the Nid, on Trondhjem Fjord, 84 m. E.N.E. of Kristiansund. Herrings, deals, copper, and train oil are the staple exports, and shipbuilding, fish-

curing, and the manuf. of machinery are local industries. Broad thoroughfares pass between rows of wooden houses. Since earliest times the coronation of the kings of Norway took place in the cathedral, which is one of the most celebrated in Scandinavia. The importance of T. began to wane after the Reformation. Pop. 45,335.

Troop, in cavalry, a captain's command. Each squadron is divided into a certain number of Ts., usually into four, each containing about thirty-two men. It is the cavalry unit in manoeuvres. If there are only two Ts. in a squadron, the number of sabres in the T. is proportionately increased.

Troopial, see TROUPIAL.

Troost (1697-1750), a Dutch painter and engraver, born at Amsterdam; he was elected a burgher of that town in 1726, and died there. He concerned himself mainly with gear and portraiture, and there are numerous examples of his skill in the Hague Museum.

Tropaeolum, Nasturtium, or Indian Cress, a genus of annual and perennial plants (order Geraniaceae) bearing brightly coloured flowers with a spurred calyx, followed by round, furrowed fruits. *T. aduncum*, Canary creeper, is usually grown as an annual against walls or on trellises and fences. *T. majus* and *minus* are the popular so-called nasturtiums of gardens. *T. polyphyllum* is the yellow rock Indian cress. The tuberous rooted species of T. are grown in pots under glass.

Trophonius, a Greek legendary architect, was the son of Erginus, king of the Boeotian Orchomenos. Apollo, reputed by some as his father, slew T. after he had erected his temple at Delphi. Henceforward the oracle of T. was consulted in a cave near Lebadeia (Boeotia).

Trophy (from Gk. *tróphion*, and *tróphos*, to rout) was in classical times a memorial of victory set up at the spot where the enemy had turned. Shields, helmets, or standards were hung on an oak or olive, and as they were dedicated to Zeus Tropæus, it was a sacrilege to remove them.

Trophy Money, a duty formerly paid in England annually by householders towards providing harness, drums, colours, and other equipment for the militia.

Tropic Bird (*Phaeton*), a genus of tropical sea birds with great powers of flight, living almost entirely on the wing. The plumage is white and the two middle feathers of the tail are very long and narrow. They nest in holes in cliffs and rocks, laying only one egg.

Tropics (from Gk. *τρέπω*, to turn) are two parallel lines of latitude on the terrestrial globe, distant 23° 30' N. and S. respectively from the equator. Outside of the T. there is no point on the earth's surface over which the sun is ever vertical. The T. of Cancer to the N. is so called because at the summer solstice the sun enters the constellation of Cancer. Similarly the southern T. is called the T. of Capricorn.

Trossachs (i.e. bristled territory), a picturesque glen of Scotland, Perthshire, between Lochs Katrine and Acharay. This rugged and narrow dole is about 1½ m. in length, and was first rendered popular by Sir Walter Scott in his *Lady of the Lake*.

Trotting. This form of horse-racing is peculiarly American, though a great part of the best trotters in the U.S.A. are descended through *Hambletonian* from the English thoroughbred *Messenger*. So popular did T. become thirty years ago in America that it practically displaced the English form of 'running,' and it still holds the first place in that country. The fastest mile trotted in America was by Lou Dillon (1902) in 1 min. 58 sec. and the fastest (1906) in 1 min. 57 sec.

'The Horse,' *Encyclopædia Americana*, 1886.

Troubadours (from Provençal *trobador*, connected with modern Fr. *trouver*, to find or invent) were the lyric poets of Provence, who contributed the finest poetry to Provençal literature. They flourished in the 12th and in the contiguous portions of the 11th and 13th centuries. Kings, nobles, knights, and merchants, monks, and soldiers were found in their motley throng. Alfonso II. of Aragon, our own Richard Cœur de Lion, and the Counts of Poitou and Toulouse sometimes joined their ranks, whilst among the professional T., the names of over 400 of whom have survived, the more famous were Arnaut Daniel, Giraut de Bornelh, Peire Vidal, Bertrand de Born, and Arnaut do Meruell. Passion and elaboration and elegance of form—truly a curious and puzzling pair—are the salient features of their songs, which tell chiefly of love and adventures like *Jaufré*, but also of war like the *Chanson des Albigeois*, or of contemporary manners like *Flamenca*. If a T. could not make his own melody, he paid for the service of a *jongleur*.

Troupial, or **Troopial** (*Icterus*), a genus of birds with yellow and black plumage. The common T. or Brazilian hangnest (*I. vulgaris*) is a handsome bird which is sometimes kept as a pet: it learns to whistle tunes.

Trout, a name applied to various members of the Salmonidæ. The common or brown T. (*Salmo fario*) varies greatly in appearance, not only with individuals but at different seasons, and this variability has led some authorities to distinguish a number of sub-species. At midsummer an adult T. is usually brownish or olive in colour, with pure white on the belly and gold on the flanks, while the back varies from olive or pale brown to nearly black. The dorsal fin and sides are spotted with black and often also with scarlet. The scales are circular, thin, and minute. When the spawning season begins in autumn all the colour disappears and the body becomes slimy to the touch. The head of the male T. is larger than that of the female, and the lower jaw bears a cartilaginous knob. It feeds on a large variety of food, different kinds appealing in turn. It is by cunning imitations of some prevailing fly that the fisherman makes his most cherished captures. The artificial hatching of T. is now carried on extensively, and lakes and streams can be stocked or replenished with fish if they are not too polluted. By

hatching the heavy loss in is reduced to a minimum. (See PISCICULTURE.) The bull T. or sca T. (*S. eriox*) most resembles the salmon in appearance and habits, though thicker in proportion to its length, and with larger and more numerous dark spots on the gill-covers and scales. The salmon T. or white T. (*S. trutta*) is a more elegant fish, and its flesh is much more delicate in flavour. The habits of both are similar. The rainbow T. (*Salmo irideus*) of America has been introduced into many parts of the world; in Britain it has proved disappointing, but it is in New Zealand, especially in Lake Taupo, that it attains the greatest size, many tons being caught yearly.

Trouvères were the poets of Northern and Central France, corresponding to the more famous troubadours of the south. They flourished at the courts during the 12th and 13th centuries, taking out with music their unimpassioned and stereotyped songs.

Trouville, a tn. and port in the dept. of Calvados, France, on the estuary of the Seine, 9 m. S. of Havre, and one of the most frequented watering-places in France. Pop. 6400.

Trover, or **Trover** and **Conversion**, in law, the name of an old form of action which lay against any one who converted or appropriated to his own use any personal property, in which the plaintiff had either a general property as owner, or a special property as bailee. Since the Common

Law Procedure Act, 1852, which practically abolished the old common law forms of action, the substance only and not the form of the action has survived.

Trowbridge, a tn. of Wiltshire, England, 9 m. S.E. of Bath, famous for its cloths and kerseys. Pop. (1911) 11,822.

Trowbridge, Sir Thomas (c. 1758-1807), an English admiral, was brought up in the naval service under Admiral Hughes in the *E. Indies*. He took up the blockade of Alexandria, but resigned it to Sir Sidney Smith in 1799. In this year he was made a baronet. In 1805 he was sent to the *E. Indies* in the *Blenheim* with a convoy of merchant ships. His vessel was last seen near Madagascar, in a violent gale, and exhibiting signs of distress; and nothing was ever discovered respecting the fate of her crew.

Troy, Ilium, or The Troad (*Τροίη*, *Τροία*, *Ἰλίου γῆ*, or *Ἰλιον, ἡ Τρωάς*), a famous city and dist. of Asia Minor, forming the N.W. of Mysia. The dist., usually known as 'The Troad,' was bounded W. and N.W. by the Aegean and the Hellespont, E. by a ridge of Mt. Ida, S. by the Gulf of Adramyttium, its coast-line extending from Lectum promontory (S.) to the E. Rhodius (N.) below Abydos. In classic legend, the earliest king of this country was Teucer, after whom the Trojans are called Teuceri or Teucirians. His daughter married Dardanus, a neighbouring chieftain, hence Dardanidæ (sons of Dardanus) is another name for Trojans. They were probably a Pelasgian race, possibly descended from Thracian emigrants. Dardanus was grandfather of Tros, whose son Ilius founded Ilium or the city of Troy (N.), the largest and strongest settlement in the Troad. The next king of T. was Laomedon, who was succeeded by his son Priam, in whose reign the famous siege of T. by the Greeks took place, to avenge the rape of Helen, wife of Menelaus of Sparta, by Priam's son Paris. This siege lasted nearly ten years, and ended with the sack and capture of T. by a stratagem of the Greeks (c. 1184 B.C.). The story is told in Homer's *Iliad*, and part in Virgil's *Aeneid*, ii. Once considered purely legendary, it is now commonly regarded as historical in the main outlines, the rape of Helen, perhaps, representing some act of piracy. Among the chief Greek heroes of the siege were Achilles, Agamemnon, Menelaus, and Odysseus; and among the Trojans, Hector, Paris, and Aeneas. The site of the ancient T. is marked by the Hisarlik mound. The explorations carried on

here by Schliemann (1870-90) and Dörpfeld (1893-94) brought to light much valuable information. Remains of some nine different cities were discovered, buried one beneath another, the earliest dating from about 3000-2560 B.C. Probably the Mycenaean fortress, sixth in number from the first of all (c. 1500-1200 B.C.), was the Homeric T. There are traces of two Greek settlements (1000-1st century B.C.) and of a new Ilium (1st century B.C.-500 A.D.). See *Herod. v. 95, vii. 75*; *Strabo, xiii.*; Leake's *Travels in Asia Minor*, 1824; Lechevalier, *Voyage de la Troad*, 1802; Joly, *Benoit de Ste.-More et le Roman de Troie*, 1870; Lydgate's *Troy-book*, 1513; Dünker, *Die Sage vom trojan Kriege*, 1869; Gorra, *Testi inediti di Storia Trojana*, 1887; Grief, 'Die Mittelalterlichen Bearbeitungen der Trojanersage,' 1886, in Stengel's *Ausgaben . . . der romanischen Philologie*; Schliemann, *Ilios*, 1881; *Troja*, 1884; Hall, *Mycenaean Age*, 1901; Dörpfeld, *Troja und Ilios*, 1902; Ridgeway, *Early Age of Greece*, 1901.

Troy, the cap. of Rensselaer co., New York, U.S.A., on Hudson R., 5 m. from Albany. West T. on the opposite bank is connected with it by an iron bridge. Much water- and steam-power is afforded. Shirts, collars, and cuffs are among the chief manufs. There are Bessemer steel-works. Pop. (1910) 76,813.

Troy, François de (1645-1730), a French painter, born at Toulouse. He became a member of the French Academy, and was afterwards sent by Louis XIV. to Munich to paint a portrait of Maria of Bavaria. He died in Paris.

Troy, Jean François de (1669-1752), a French painter, son of François de T. (q.v.), born in Paris. He became director of the French Academy at Rome, where his death occurred. The Louvre has some of his best pictures, while others are in the museums of Dijon, Orleans, and Montpellier.

Troyes, the cap. of the dept. of Aube, France, 104 m. E.S.E. of Paris by rail. The settlement once of the Triassi. T. is noted for its Gothic cathedral of St. Pierre. Here in 1420 was signed the treaty granting the French crown to Henry V. There are now thriving hosiery manufactures. Pop. 55,486.

Troyon, Constant (1810-65), a French painter, born at Sèvres. He excelled as a painter of cattle, and there are pictures from his brush in the Louvre, the Wallace Gallery, and the Glasgow Municipal Museum. He died at Paris.

Troy Weight. The term probably

originated from weights used in the town of Troyes, in France. The term 'troy' was first applied to the standard pound in 1495, and was exclusively employed by the dealers in the precious metals, gems, and drugs. The troy pound contains 12 oz.; each ounce 20 pennyweights, and each pennyweight 24 grains. Thus the pound contains 5760 grains, and is to the avoirdupois pound as 144 to 175. For medicines the troy pound is divided into 12 oz.; each ounce into 8 drachms; each drachm into 3 scruples, and each scruple into 20 grains.

Truce, a pre-arranged suspension of hostilities for a certain period between two opposing states or armies. During this period no advancement of ground or act of hostility is allowed. In active warfare, the exhibition of a white flag is taken as a symbol of submission, and the opposing party cease hostilities.

Truce of God. *see* GOD'S TRUCE.

Truck Acts. The objects of the T. A. are: (1) To ensure the payment of wages in hiring contracts, in coin; and (2) to render illegal any provision in a contract for the payment of wages otherwise than in current coin. Historically the T. A. had their origin in 15th century enactments framed to put an end to the practice of defrauding workmen and labourers by paying them in goods of a poor quality, or by making unreasonable and excessive wages. The A.

make any deduction or set-off for goods supplied, either by himself or through any agent of his; and, further, contracts which attempt to specify the place or manner in which wages are to be expended are null and void. The Act of 1896 punishes employers who make contracts with workmen for any deductions from wages by way of fines, unless (1) the terms of the contract are contained in a notice kept constantly posted up in some conspicuous place; and (2) the contract is in writing and signed by the workman, and specifies the acts or omissions in respect of which fines may be imposed, and the amount of such fines. In any event fines can only be imposed for acts or omissions likely to cause damage or loss to the employer, or 'an interruption or hindrance to his business.' There are similar provisions in the Coal and Metalliferous Mines Regulation Acts. The principal exemptions from the T. A., apart from those impliedly stated above, are: (1) deductions (under written contracts) in respect of

materials and tools to miners, fuel, provender for beasts in business, rent, and medical attendance; and (2) deductions for advances by way of contributions to benefit societies or for education of children (including, of course, payments under the National Insurance Act, 1911). *See* MacDonnell's *Law of Master and Servant*; *Smith's Law of Master and Servant*. *See also* FACTORY AND WORKSHOP ACTS.

Truffles are underground fungi. The British T. (*Tuber aestivum*) is found just below the surface in beech and oak plantations in the autumn. When mature it is hard and black and warted externally. Inside it is mottled with white and yellowish brown. The T. used in France is *T. melanosporum*, and the garlic-scented T. of Italy is *T. magnatum*.

Trujillo: 1. The birthplace of Pizarro and the centre of an agricultural district. 25 m. E. of Caceres, in Spain. Pop. 13,000. 2. A seaport, trading in cattle, dyewoods, mahogany, and fruits, on the Bay of Honduras, Central America. Pop. 4000. 3. The seat of a bishop and a university town, with ruins of the ancient Indian city of Grand Chimú, 310 m. N.N.W. of Lima, in Peru. Pop. 7000. 4. A state and its capital in the N.W. of Venezuela. The town communicates by rail with La Ceiba on the S.E. shore of Lake Maracaibo. Area 4350 sq. m. Pop.

10. Pop. of tn. 10,000.

Trullan, the name given to the council which was also called Quintisext. The sixth council was confined almost entirely to doctrinal decisions. In order to supply the want, 211 bishops assembled in 692, in a hall of the imperial palace at Constantinople, called the Troullos. It is chiefly important as being the council in which was laid down the legislation of the East on clerical celibacy.

Trumbull, James Hammond (1821-97), an ethnologist and philologist, educated at Yale. He gave much time to the study of the Indian languages of N. America. He lectured at Yale University on this subject. His most important works are *The Colonial Records of Connecticut*, and *The Best Method of Studying the Indian Languages*. He was Secretary of State to the U.S. government from 1861-64. Three American universities honoured him with degrees.

Trumbull, John (1756-1843), an American painter, hovered all his life between his native country and England, where he studied under Benjamin West. He is pre-eminently the artist-historian of the War of Independence, in which for a time he

served as aide-de-camp. The largest set of his pictures is in Yale College, but

'Declaration of Independence' and three other great pictures now adorn the Capitol at Washington.

Trumbull, Jonathan (1710-85), an American patriot, rose to become governor of his native state of Connecticut (1769-84) after being county judge for seventeen years. During the War of Independence he enjoyed the confidence of Washington, who appealed to him as 'Brother Jonathan.'

Trumpet, a brass wind instrument. It consists of a long, narrow, straight brass or silver tube, bent twice on itself so that two of the parallel branches form with the third a kind of rectangle with rounded corners. The mouthpiece is cup-shaped and the other extremity broadens out like a convolvulus. Besides the simple T. used in cavalry regiments, there are valve and slide Ts.

Trumpeter, or *Psophia*, a genus of S. American birds allied to the cranes. *P. crepitans* is a bird of lustrous and brilliantly-coloured plumage and is often domesticated.

Trumpeter Fish, or *Latris hecateia*, an important food fish of Australia and New Zealand. It is finely flavoured and grows to a weight of 50 or 60 lbs.

Trumpet Fish, Snipe Fish, or *Centriscus scolopax*, a small fish widely distributed in warm seas and sometimes found off the S. coast of England. The snout is in the form of a tube.

Trunk-fish, another name for the coffee-fish (q.v.).

Truro: 1. (The *Treuru* of the Domesday Book.) A city with a modern cathedral (1880), 11½ m. N.N.E. of Falmouth, in Cornwall, England. There are tin-smelting works. Pop. (1911) 11,325. 2. A manufacturing city on Cobequid Bay, 61 m. by rail N.N.E. of Halifax, in Nova Scotia. Agriculture and lumbering are the chief occupations followed in the vicinity. Pop. 6400.

Truss, see HERNIA.

Trust: 1. *Legal*.—A T. is an 'equitable obligation binding a person (who is called a trustee) to deal with property over which he has control (which is called the T. property) for the benefit of persons (who are called the beneficiaries) of whom he may himself be one, and any one of whom may enforce the obligation.' (Underhill on *Trusts and Trustees*.) Legal historians for the most part trace the development of Ts. in English law through the doctrine of *uses*. In all probability the Chancery lawyers, who were ever indebted to the principles of civil law, borrowed the whole idea direct from the Roman *fidei*

(q.v.). Equitable estates are not now ignored or by the common law (see T. in construing a T. or

considering the powers or duties of trustee and beneficiary respectively, it is necessary to observe that the trustee usually has the legal ownership of the T. property, subject, of course, to his fiduciary obligations; while the beneficiary has only the equitable ownership, though such ownership confers upon him the beneficial right to the income or other profits accruing from the property. Any act or default on the part of a trustee which is unauthorised either by the terms of the instrument creating the T. or by law is called a breach of T., in respect of which the beneficiary is entitled to sue for damages. The appointment of a public trustee may be made either by the creator of the T., by the person having by the Trustee Acts or by the T. instrument power to appoint now or additional trustees when required, or by the court. The public trustee is forbidden by the Public Trustee Act, 1906, to accept the responsibility of certain Ts.; e.g. Ts. exclusively for religious or charitable purposes, Ts. for the benefit of creditors; and Ts. involving the management of a business. Ts. are said to be: (a) *Express*, when created intentionally by the act of the settlor. Express Ts. are generally created by deed or will. They are the common means whereby owners of property provide for their issue on their own death or settle property on their children at marriage. (b) *Constructive*, when, though the legal title to property is in one person, the court will decree that he ought in equity to hold the property subject to the beneficial enjoyment of another. (See *CONTRACTS*, and *FRAUDS, STATUTE OF*.) All property, real (q.v.) or personal, whether situate at home or abroad, and whether in possession or in action (see *CHOSE IN ACTION*), remains (q.v.), subject (q.v.), made it inalienable (e.g., pensions and salaries to public servants), or being land the tenure (see *TENURE*) is inconsistent with the Ts. sought to be created. The expressed object of the T. must be lawful or it will be held void; hence Ts. conducive to immorality or fraud, Ts. restricting the power of alienation of the beneficiaries' interest, are void (see also *RESTRAINT OF MARRIAGE, PERPETUITIES, THIELLUSSON*). Ts. of land must for the most part be evidenced by writing signed by the settlor. Ts. of personal property may be created orally,

though it would be highly inadvisable not to employ writing.

2. *Commercial.*—A commercial T. is a combination of companies or individual traders designed to secure the monopoly of a particular market. From the fact that the U.S.A. is pre-eminently the congenial soil for the T., it is argued by the opponents of protection that a system of tariff duties necessarily results in the creation of an artificial wall behind which the T. springs up and prospers to the detriment of the small trader and the consumer. Where a given prohibitive duty does operate to keep out foreign goods and foster the development of the corresponding home industries, it is at least a plausible argument that the output of the latter in process of time may or must exceed the home demand, and unless this surplus can be 'dumped' on the market of a 'free-trade' country there is *pro tanto* no market for it. But if a ring of the largest concerns is formed by pooling the capital of each, this ring or T. can buy out all the small concerns, limit the supply of the particular commodity back until price to the fancies of

T. The colossal

can Standard Oil, the Steel, and Beef Ts. taken with the beef 'famine' of recent years is cogent evidence that some such economic consequence flows from the formation of the T. The antipathy to the T. of the free-trader seems further justified by the spectacle of the domination of American politics by the Standard Oil and Steel Ts. The least American have been foug

and the passing of the Anti-Sherman T. law is a sure indication of the hatred of the T. entertained even in America. To English eyes the effect of the T. on American politics is one of sheer corruption, the enormous wealth of the T. 'kings' enabling them to secure seats in Congress and shape legislation to their own ends; and perhaps it was not surprising that when Sir William Lever of Port Sunlight formed his Soap T. in England, the *Daily Mail* inaugurated and carried through to its own eventual discomfiture a campaign against Sir William of unparalleled vigour (see on this ADVERTISEMENTS). There can be little doubt that the customary accuracy of the *Daily Mail* was at fault on this occasion. Apart from the personal integrity and tremendous popularity of Sir William Lever, the English electorate and English politics are not to be captured by commercial Ts.

Trust Companies are those which

are formed to administer any kind of trust, though in practice their business generally consists in managing trusts arising under mortgages given by corporations to secure an issue of bonds. They also carry on safe deposit business; that is, they undertake to keep in safe custody valuables for customers to whom they rent safes for that purpose. The administration of trusts by these companies, involving, as it necessarily does, remuneration for the duties of trusteeship, was in its inception distinctly contrary to the legal assumption of the gratuitous nature of individual trusteeships; and since they became an established feature, banks have perforce had to charge a fee for that office.

Trustee Stocks. A trustee, unless expressly forbidden by the terms of the trust instrument, invests the trust funds in his hands in: (1) The public funds or government securities of the United Kingdom, or in any parliamentary stocks; (2) real or heritable securities in Great Britain or Ireland; (3) stock of the banks of England or Ireland; (4) India, 3½ and 3 per cent. stock; (5) securities, the interest of which is for the time being guaranteed by parliament; (6) consolidated stock of the Metropolitan Board of Works, or of the London County Council; (7) debentures or preference stock of any railway company in Great Britain or Ireland, provided such company has, during each of the ten years last past before the date of investment, paid a dividend of not less than 3 per cent. on its ordinary stock; (8) debenture stock of any railway company in India, the interest on which is guaranteed or paid by the Secretary of State for India; (9) 'B' annuities of the Eastern Bengal, E. Indian and Scind, Punjab, and Delhi railways; (10) stock of water supply companies in Great Britain or Ireland; (11) inscribed stock issued by any municipal borough having a population of over 50,000, or by any county council.

Truth, a sixpenny weekly paper founded in 1877 by the late Mr. Henry Labouchere.

Tryon, see STING RAY.

Tryon, Sir George (1832-93), an English admiral, was in command of the first British iron-clad, the *Warrior* (1861-64). Director of transports during the Abyssinian expedition of 1867, he was afterwards commander-in-chief on the Australian station (1884-87). At the time of his death, due to a fatal collision between the ill-starred *Victoria* and the *Camperdown* off Tripoli, the consequence of his erroneous command, he was in charge of the Mediterranean fleet.

Trypsin, one of the ferments secreted by the pancreas (q.v.); by its action albuminates are turned into tryptones or peptones. It is used in medicine, being administered in capsules, specially composed so as to pass into the intestines before solution.

Tsad, see CHAD, TCHAD, OR TSAD, LAKE.

Tsaidam (more correctly Tsädam), a Central Asian region, lying between N.E. Tibet and W. of the Koko-nor, formerly the bed of a vast salt lake.

Tsar, or Czar, a popular title of the Russian emperor, his wife being called 'Tsaritsa.' It has a common origin with the German 'Kaiser' in the Latin *Cæsar*.

Tsarskoye Selo, a tn. in the gov. of St. Petersburg, Russia, 15 m. S. of St. Petersburg. It is a summer resort and contains two royal palaces. Pop. 23,000.

Tschaikowsky (or Tchaikovski), Peter Ilyich (1840-93), a composer; settled in St. Petersburg in 1850, where he joined Anton Rubinstein's new Conservatoire in 1862. From 1866-77 he was professor of harmony at Nicholas Rubinstein's Conservatoire at Moscow. An unhappy marriage then disturbed his life for a time, but in 1879 he was freed from the necessity of teaching, and withdrew to the country and devoted himself to composition. As a composer T. shows remarkable versatility: he attempted operas, e.g. *Foyevode* (1869), *Eugen Onegin* (1879), *Maid of Orleans* (1881), symphonies, chamber, vocal, and instrumental music, and in every branch he accomplished masterpieces, e.g. his 4th, 5th, and 6th symphonies, his string quartets, his piano concerto in B flat minor and violin concerto in D minor, and his splendid orchestral pieces, *Francesca de Rimini* and *Romeo and Juliet*. His genius was essentially national, and his music expresses all the mingled fire and melancholy of the Slavonic temperament. See *Life* by E. Evans (Master Musician Series).

Tschudi, Aegidius, or Schudy, Gilles (1505-72), a Swiss chronicler, became 'landammann' or chief magistrate of his native state. His *Chronicon helveticum*, 1501-1470, in spite of its unreliable character, remains a groundwork of Swiss history.

Tschudi, Johann Jakob von (1818-59), a Swiss naturalist, spent five years in Peru and published valuable works on the antiquities and drama of that country, besides on its 'fauna' (1844-47), and on his own travels there and in other parts of S. America.

Tseng Ki-Tseh, Marquis (1839-90), a Chinese diplomatist, succeeded in winning back the province of Ill or Kul as special envoy at St. Peters-

burg (1881). In 1886 he was nominated at home to the presidency of the Admiralty Board.

Tseng Kwo-Fan (1811-72), a Chinese soldier, was largely instrumental in crushing the Taiping rebellion. Between 1851 and 1862 he was busily engaged in clearing the provinces of Hunan, Kiangsu, Cheh-kiang, and Ngau-hul of the rebels. Finally in 1864 he captured their stronghold, Nanking. His services were rewarded with the highest offices of state.

Tsetse Fly, or *Glossina morsitans*, a fly belonging to the same family (Muscidae) as the common house flies, and a cause of enormous loss among domesticated animals in Uganda and other parts of Africa. It is a blood-sucker, and though its bite is not itself dangerous, it is the means by which a parasitic protozoon is introduced into the blood causing nagana or fly-disease. The fly breeds in low-lying damp localities. It is similar in appearance to the house fly, and has a very long and slender proboscis. The wings are more leaden and more opaque, and the thorax is chestnut with four black longitudinal stripes. The abdomen is yellowish-white with a black spot on four of the five segments. Another species of the genus conveys sleeping sickness.

Tsimshians, or Chinmeseans, a tribe of N. American Indians, now almost extinct, who dwell along the shores of the Pacific, facing the Queen Charlotte Islands.

Tsinan-fu, a tu. in the prov. of Shantung, China. The chief manuf. is silk, and it also trades in precious stones. Pop. 250,000.

Tsitsihar, the cap. of a prov. in Manchuria, China, on the Nonni. It is a penal settlement. Pop. 30,000.

Tsu, a tn. in Honshu, Japan, 46 m. E.S.E. of Kyoto. Pop. 41,229.

Tsuruga, a tn. of Japan, 50 m. N.N.E. of Kyoto. It has a good harbour, and is an important trade centre. Pop. 13,000.

Tsushima, an island of Japan, situated S. of Korea. At high water the island being . . . of both this n . . . fleet was . . . ances under

Tuam, a tn. in co. Galway, Ireland, 19 m. N.N.E. of Galway. It is the seat of an Abbey and a Roman Catholic par. Pop. 2,000.

Tubas, in music, tenor and brass wind instruments, valved, and a lutey tone.

Tube Flower (*Clerodendron siphonanthus*), a shrubby plant (order Verbenaceae) with racemes of funnel-shaped flowers.

Tuber

Tuber, the thickened end of a subterranean stem bearing minute buds from which, after a period of suspended growth, a new plant arises.

Tubercle and Tuberculosis. The tubercles which characterise the disease classed under tuberculosis are the result of the attack of the tubercle bacillus and the defensive operations against it. The bacillus is a non-motile organism, rod-like, with rounded ends. Koch, 1882, announced his success in isolating and cultivating it. The Licht-Nielsen method of staining is practically specific. Sputum on a cover glass is allowed to dry, and is then passed, glass downwards, three times through a spirit flame. It is then placed, film downwards, on a solution fuchsin (1), absolute alcohol (10), 5 per cent. aqueous carbolie acid solution (100), and is then heated till it steams. After 3 to 5 minutes, it is washed and dipped in sulphuric acid (1 in 4); then rinsed in 60 to 70 per cent. alcohol several times, and finally with water; then counterstained with a 1 per cent. aqueous solution of methylene blue, giving red bacilli on blue. Koch cultivated it on coagulated blood-serum. The bacillus of the mammalian disease lives between temperatures of 29° C. to 42° C., flourishing best at 37-38° C. It is destroyed, generally, after 4 to 6 hours at 55° C.; 15 minutes at 65° C.; 5 minutes at 80° C.; 2 minutes at 90° C., and in less at boiling point. Its resistance to desiccation is very marked; if not exposed to sunshine it retains its virulence for as much as six months; exposure in direct sunlight kills it in a few hours. Metchnikoff studied the effect of the attack in the human body, determining the ingestion of the bacillus by leucocytes and the cells of connective tissue and of the lining of the alveoli. These phagocytes throw off antitoxins, or absorb the bacilli, after they have been acted on by opsonins (Sir A. Wright). If the attack succeeds, leucocytes are destroyed and form pus. *Grey tubercle* is the first and most characteristic lesion; it varies in size from a pin point to a small pea, and is slightly translucent, consisting of small and large cells containing bacilli. These tubercles gradually change to opaque, slightly granular, dry and friable *yellow tubercles*, which coalesce, increasing in size. Blood vessels are found in neither variety, but the lesions produce inflammation of tissue, often and abscess. *Yellow* is due to caseation, originating in the centre of the grey tubercle and spreading till the whole has the appearance and

consistence of cheese; the caseous mass may then calcify and the disease be stopped; in small tubercles the change may be to a mass of fibrous tissue. The deposition of lime salts encloses the bacilli and kills them. In the case of suppuration and abscess, discharge leaves cavities with weakened walls open to further attack and disease spreads. The leucocytes themselves may migrate and spread infection.

Tuberculosis is infectious, and infection has been generally attributed as from other human patients, or from animals used for food, especially cattle and pigs. The chief means are inhalation of dried expectoration particles, or of wet particles, as in kissing or during coughing, or the ingestion of tuberculous milk or other foods. The question of identity of tuberculosis of the bovine and avian type with that of man is not yet definitely settled. Koch is against identity, and Von Behring considers bovine bacilli more virulent in man. The Royal Commission interim report of 1904, and that of the Tuberculosis Congress in Paris, 1905, lean to Von Behring's view; the final report of the former, 1911, considers identity as true for bovine and porcine, but not for avian tuberculosis. The general tenet is that infection from milk is prevalent among children, and otherwise is due to overcrowding, particularly of bedrooms, and neglect of isolation. Attention to these and the innumerable improvements due to greater prosperity in England have led to a fairly steady decrease in phthisis in males of 8.8 per cent. on the average in quinquennial periods since 1876; for the years 1909-11 the saving in life in tuberculosis, on a calculation from similar figures, amounted to over 170,000, or between 4 and 5 per cent. of the saving on all diseases. In 1904 the ratio of deaths from tuberculosis to those from all other chief acute infectious diseases was 60:67; the disease also appears to act chiefly between the ages of twenty-five and forty-five. Among the causes of susceptibility to infection, physical over-exertion stands high; malnutrition and alcoholism also play a large part. Influenza, whooping cough, measles, and to a less extent scarlet and enteric fevers predispose to success of attack. Hereditary transmission is, of course, unproved, though intra-uterine infection is known; hereditary predisposition is also quite uncertain. The disease being so widespread, so distributed in age and sex, its latent period so indeterminate, statistics are extremely difficult to collect correctly, and much of the subject is still sub

country were made by Dr. Stukeley in the neighbourhood of Stonehenge. The remains found in the Wiltshire barrows indicate three distinct stages or eras of society. The first was before the introduction of metals, when arms and implements consisted of flint or bone; the second, when these articles were of brass; and the latest, when iron instruments, arms, and utensils accompany the deposit. Of the sepulchral urn, of which a great number have been found in the tumuli, there are two varieties, indicating different periods of mechanical art.

Tun, a variable measure of capacity formerly used for measuring liquids, e.g., a tun of wine = 252 gallons.

Tunbridge, see **TONBRIDGE**.

Tunbridge Wells, a municipal bor. and watering-place of Kent, England, 4 m. S. of Tonbridge. Its chalybeate springs were known in the time of James I. and were much frequented in the 18th century. The Pantiles is a fashionable parade there. T. W. ware (wood-mosaic) is manufactured. Pop. (1911) 35,703.

Tundra, a term applied to a geographical region in N. Russia and Siberia, but now generic for all such

regions in Canada, which by its consequence is not completely frozen, except for a depth of a foot or two during summer, at which season the surface water forms pools, lakes, and marshes, the formation of which has been largely determined in the larger features by the ice cap extending over it during the glacial age. The vegetation is scanty, consisting of mosses, lichens, dwarf shrubs, and an 'Alpine' flora. Except for the reindeer or caribou and musk-ox, the fauna consists of small furred animals, whose skins are sought by hunters and trappers. In the N. the T. passes into arctic glaciated condition; its southern boundary merges gradually into coniferous forest.

Tung-Chang, or **Tung-chang-fu**, a tn. of Shantung prov., N. China, on the Tatchin near the Grand Canal, 50 m. from Tsi-nan. It is an ancient city and an important mart for merchandise.

Tung-kuan, a customs station of Shensi prov., China, on Yellow R. The main route to Central Asia passes by it.

Tungsten (W, 184); a metallic element which occurs in nature as wolfram (iron tungstate), Scheelite (lead tungstate), and wolfram ochre

(T. trioxido). The metal can be obtained by reducing the trioxide on charcoal with hydrogen. It is a hard grey metal (melting point 1800° C., sp. gr. 19.1) and is used as an alloy with steel to form self-hardening steels.

Tunguragua, a prov. of Ecuador, named from the snow-clad volcano of the same name, subject to violent eruptions, and one of the most noted peaks of the Andes.

Tunguses, the name given to a branch of the Mongolian, or Mongolo-Tartar, race, which dwells in the mountainous districts of Eastern Siberia, and the region drained by the R. Amur. The Tunguses number about 50,000. They are not confined to any particular region, but wander about from place to place in search of grazing for their flocks and herds. Thus they lead but a very precarious existence, and fall an easy prey to the cupidity of the Russian settlers. In common with most of the Siberian aboriginal races, they are fast diminishing in numbers. They profess the religion of Buddha, as do most of the Mongolian Siberians.

Tunguska, the name of three rivers, Upper T. or Angara, Middle T. or Podkamenneya, and Lower or Nizhnaya T., of E. Siberia, tribs. of the Yenisei. The last and chief of the three (1680 m. long), in Irkutsk, Yakutsk, and Yeniseisk govts., rises near Kirensk and joins the Yenisei near Turukhansk.

Tunic, the Latin name of the principal undergarment of men and women, corresponding to the Greek chiton. Women wore the 'palla' over it, and men the 'toga.' It was of woollen material with short sleeves (if any), and reached to the knees in a man, to the feet in a woman. It was usually worn with a girdle, and was adorned with a narrow or broad purple stripe for a knight or senator respectively. The name is also applied to an ecclesiastical vestment, or to any short loose garment reaching from the neck to above the knee.

Tunicata, a class of marine animals which is regarded as a degenerate offshoot from the vertebrata in their adult

life, fixed to rocks or to the seabottom, occurring chiefly in the form of cartilaginous or leathery sacs. Many are joined into colonies, such as the various species of Botryllus which form richly-coloured gelatinous incrustations on rocks and seaweeds. A familiar example of a solitary kind is *Ascidia mentuata*, the sea squirt, which lives on muddy bottoms near the coast. It is greyish

green in colour, and conical with two orifices. Its egg hatches into a minute tadpole-like larva which, after a few hours' free swimming, attaches itself head foremost and undergoes an extraordinary degeneration.

Tuning-fork, a steel instrument with a base and two prongs which give a tone of definite pitch when made to vibrate by striking or bowing. It is the most accurate standard of pitch, since variations due to rust, temperature, etc., are extremely slight. Usual pitches, A or C. Invented in 1811 by John Shore.

Tunis: 1. A dependency of France in N. Africa, lying on the Mediterranean Sea, between Algeria on the W. and Tripoli on the E., with an area of 50,000 sq. m., including that portion of the Sahara lying E. of the Belud Djourid, extending towards Gadames. The pop., mainly Bedouin arabs, Kabyles, and Jews, is about 2,000,000. The surface is mountainous in the interior. The region in the neighbourhood of the Mediterranean coast is fairly well watered and fertile, but towards the central table-land, bounding on the Sahara, the soil is very poor. The chief industry is agriculture, the principal products being wheat, barley, oats, dates, almonds, oranges, lemons, shaddock, alfalfa grass, cork, pistachios, and henna. Much wine is made and olive oil is also produced. The mineral resources are being steadily developed, and lead ore, zinc ore, phosphates, and iron are worked. The chief ports are Tunis and Bizerta, while there is good harbourage at Gabes, Sfax, and Susa. The native industries include spinning and weaving, saddlery, pottery, slipper-making, and matted. The fisheries are also important, being mainly in the hands of the Greeks, Maltese, and Italians. 2. The cap. of the above dependency, stands on a bay of the same name, surrounded by lakes and marshes, 10 m. from the sea, and 275 m. N.W. of Tripoli. Its port is Goletta. T. is a walled town, and its harbour is well defended. Velvet, silks, linen, and fez caps are manufactured. There are many mosques, and the houses are nearly all built of stone. Pop. estimated at 250,000.

Tunkers, see **DUNKERS**.

Tunnelling. The art of T. is a very ancient one, and was on many occasions used and improved upon by the Romans, many of their rock-cut tombs and sepulchres being wonderful specimens of workmanship. The Mont Cenis tunnel, the first to pierce the Alps, was a great advance in modern T. Rock-drills worked by compressed air were used, and this fact, together

with the excellent ventilation and the use of the 'shield' and iron lining, greatly facilitated the work and lessened the danger. The system adopted in England is to set out the centre-line of the tunnel on the surface of the ground. Shafts are then sunk at suitable points. From the bottom of these shafts the heading work is commenced in each direction. The top portion or heading is excavated and the crown bars and poling boards set in position; the size of the crown bars depending entirely upon the weight of earth to be supported. The heading is brought up to the requisite width, and all the upper timbers are placed in position. Sinking proceeds to the level of the bottom sill or timbers and the upper sill is supported by vertical props while raking shores are fixed. Sections are thus excavated of sufficient length to allow the centering to be placed in position, upon which the lining of brickwork is built. Upon the completion of one section, the crown bars are drawn forward to support the crown of the next section to be excavated. The thickness of the brickwork or other lining depends, of course, upon the weight of material to be supported. The system adopted in America consists in timbering the whole heading, the timbering remaining as the lining of the tunnel. Under the Belgian system, the top heading is first excavated, the upper cone being removed so as to allow the crown of the arch to be built. The arch is then underpinned and the side walls built up to the springing. Two parallel headings are constructed in the German method and the side walls then built. When the upper portion of the heading is removed the arch is built, the centering being supported by the unexcavated material, part of which is left until the last for this purpose. It will be seen that the timbering is more economical than in the English system. Experience shows that sandstone is the easiest material to tunnel through, while igneous rock is the most difficult. The latter, however, requires no lining. Running sand is most difficult and dangerous to tunnel through, and requires a great quantity of timber. All tunnels are constructed with a sufficient gradient to allow the water to drain off. A sewer is also constructed down the centre of the tunnel under the surface, having inlets from gulleys on either hand. In some cases, an open channel is formed to carry the water away. In constructing tunnels under rivers and other waterways, the ordinary methods may be adopted so long as the earth or formation

above is impermeable to water. At all times, however, water in large quantities may be encountered, and pumping will have to be resorted to prevent flooding. The

Tunnel is $4\frac{1}{2}$ m. long, and longest in England. It was in of construction from 1873 to 1886. Headings were driven from the shores and a lining of vitrified brick built in Portland cement was used. The gradients at the entrances are 1 in 90, and 1 in 100, and the centre portion is level. The tunnel under the Mersey between Liverpool and Birkenhead was in course of construction from 1880-86, and is $1\frac{1}{2}$ m. long. The gradients at the ends are 1 in 27 to 1 in 30, and the central gradient is 1 in 900. The cost per all rolling stock an £284. The Simplon

the Alps is $12\frac{1}{2}$ m. long, and was opened in May 1906, having been under construction from 1898. This work consists of two single-line tunnels, and is the longest tunnel in the world. There is a gradual rise of 1 in 500 for $5\frac{1}{2}$ m. from the N. end, when the gradient becomes 1 in 143 to the Italian end. There are cross-connecting tunnels between the two traffic tunnels every $\frac{1}{2}$ m. The trains are hauled through the tunnels by electric locomotives. While the work was being carried out, considerable difficulty was experienced by the influx of springs of hot water. Brunel was the inventor of the shield system of T., and it was first used to construct a tunnel under the Thames near London Bridge in 1825. The lining of the tunnel was of brickwork, and the shield was pushed forward by screws as the work proceeded. The same system was adopted by Barlow in constructing the second tunnel under the Thames, but he lined the tunnel with cast iron. Greathead also employed this system very largely, and it is now generally favoured in constructing deep tunnels, especially for electric railways. It allows of a minimum of disturbance on the surface and at the same time greater speed is obtained in the work of T. The speed obtained for the construction of ordinary brickwork tunnels is at the rate of about 1 ft. per day, but the rapid speed of 6 in. per hour was obtained in constructing the Central London Railway Tube, a throughout the shield consists of about 2 in. large the cast-iron lining of the tunnel. A series of hydraulic rams are spaced equally round this casting, the heads pressing against the iron at the rear. The front of the

consists of segmental castings to which are fastened steel plates forming a conical cutting surface. A fixed behind the ss to the working through a rectangular

The men work in a heading which has been constructed in front of the shield, and the shield is pushed forward by the rams. The space left by the shield around the lining is filled by growing under pressure. See also GREATHEAD. See

fish of the family Scombridae, allied to the mackerel. It is found in the Mediterranean, where its fishery has been a regular industry since ancient times. It attains a length of 10 ft. and a weight of 1000 lbs.

Tunstall, Cuthbert (1474-1559), an English prelate and distinguished scholar, studied at Oxford, Cambridge, and Padua. He held several livings, was Master of the Rolls, dean of Salisbury, bishop of London, then of Durham, and keeper of the Privy Seal (1523). He was employed by Henry VIII. and Wolsey on diplomatic business abroad and formed a friendship with Erasmus. He accepted the royal supremacy in religion, but disliked the reforms of Edward VI. and was deprived of his see (1552). Restored under Mary, he was again deprived under Elizabeth and died a prisoner at Lambeth.

Tunstall, James, D.D. (c. 1710-72), a churchman and scholar, educated at Cambridge. He was the first to question the authenticity of the correspondence between Cicero and Brutus. His own works are mainly theological or political.

Tupac Amaru II., or José Gabriel Condorcanqui (1742-81), a Spanish-Peruvian revolutionist, grandson of Tupac Amaru and known as 'the last of the Incas.' He headed a rebellion against the Spaniards (1780), the Peruvians getting control from Cuzco to Lake Titicaca, but was finally captured and cruelly executed with most of his family.

Tupi-Guarani, the name of two important tribes of S. American origin, extending from the Amazon to the Lower Paraguay and to the foot of the Peruvian Andes. At one time there were numerous Jesuit missions, especially among the Guaraní. A corruption of the name is spoken as the trade name of the Amazon region. The Tupi surpassed the other

Brazilian aborigines in culture and civilisation.

Tupper, Sir Charles (b. 1821), a Canadian statesman, born at Amherst, Nova Scotia. He studied medicine at Edinburgh and practised in his native town. He has occupied numerous important positions under the Canadian government, becoming premier in 1896, though but for six months.

Tupper, Martin Farquhar (1810-89), an English author, born in London. He published much poetry, including *Proverbial Philosophy* (1833-76), which was immensely successful, but is turgid and commonplace. T.'s works, highly regarded by many in their day, are now rarely seen. His Autobiography appeared in 1886.

Turanian, a philological term applied to one of the great classes of human speech, including all the Turki peoples of Central Asia. It was then extended to almost every non-Aryan race in Asia and so ceased to have much value, and is practically obsolete.

Turbary, in law, *common of Turbary* is the right which a tenant enjoys of digging turf from the waste lands of a manor (see COMMON, RIGHT OF).

Turbines. It is usual to refer to Hero of Alexandria, 120 B.C., as the inventor of the first T., sufficiently explained in Fig. 1. In 1649 A.D., Branca turned a wheel fitted with

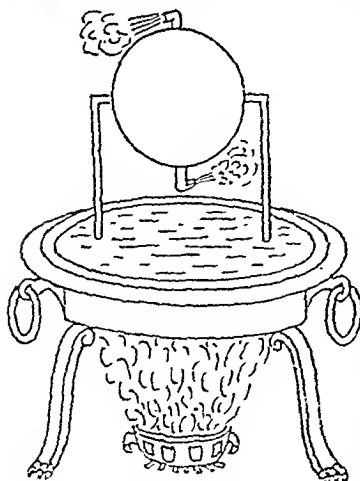


FIG. 1

vanes by means of a steam jet, Fig. 2. It seems at first curious that a really practical engine on this principle was not produced until 1884, when the

Hon. C. A. Parsons constructed a 6 horse-power engine, now in the S. Kensington Museum. The object of steam engines being to rotate a shaft, the reciprocating type is comparatively clumsy and complicated.

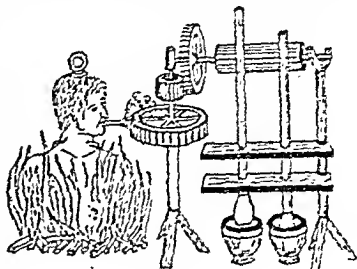


FIG. 2

There are two chief reasons for its adoption and perfection before that of the simpler T.; the latter has had to await the development of metal-working tools and the scientific manufacture of metals of specially adapted properties, while in addition it is only possible with a thorough knowledge of the theory of heat and steam. T. are usually classed as *impulse* or *reaction*. In the former vanes or buckets, on a wheel keyed to the rotating shaft, are acted upon by steam from a nozzle, so designed as to allow expansion before reaching the buckets; the impulse, due to the high degree of kinetic energy thus developed, is thus the chief element in producing motion. The buckets are so shaped as to turn the steam gradually without shock backward.

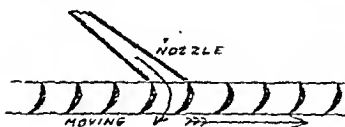


FIG. 3

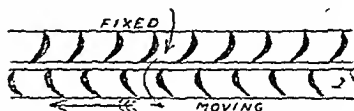


FIG. 4

In the reaction type the steam impinges on the buckets without expansion, but giving some impulse; the blades are, however, so converged as to cause the steam to acquire higher velocity before passing out, and the reaction thus produced is the chief factor in causing motion. In

both types the kinetic energy developed in the steam should, before exhaust, be converted into useful work, and the difference may be expressed by considering the expansion in the reaction type to be spread gradually over the passage through a series of vanes. Figs. 3 and 4 illustrate the two types.

De Laval steam turbine.—In this, patented by Dr. G. de Laval of Stockholm in 1888, a specially constructed nozzle directs the steam on to vanes arranged in a single ring on the rim of a revolving cylinder. The vanes, shaped in section as shown in Fig. 3, are carefully and firmly fixed by placing in shaped sockets and held by packing pieces. Steam, which is superheated, enters by the pipe at the top, passes through the governor-valve chamber to the nozzle-chamber below; after passing through the spaces between the vanes it enters the exhaust-chamber (and thence to the condenser). The shaft of the wheel supported on bearings communicates by a pinion with the large heavy wheel. The nozzle can be regulated, as shown, by hand, and when the load is small, some can be shut off. The velocity of steam on issuing from the nozzle is very high, and as the best efficiency is obtained by working at wheel circumferential velocity equal to half this, very high revolution is demanded. This is often of 20,000 per minute, but can be reduced by steel double helical gearing to 2000. This speed is, however, altogether excessive for marine work, and the type is, therefore, not so used. It is much used for driving dynamos, being installed on ships for the purposes of lighting.

The Parsons steam turbine.

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blades, means of The form. blades, and the latter revolving or moving blades. The diameter of the spindle is less than the internal diameter of the cylinder, and thus an annular space is left between the two. This space is occupied by the blades, and it is through these the steam flows. The steam enters the cylinder by an annular port at the forward end; it which it strikes the blades at such an angle that it exerts on them a rotary motion. The steam leaves the

naturally been deflected. The second ring of fixed blades is therefore interposed, and these direct the steam on to the second ring of rotating blades. The same thing occurs with succeeding rings of guide and moving blades until the steam escapes at the exhaust passage. The guide blades give direction and velocity, the steam doing work on itself to produce velocity, which is converted in the moving blades into useful torque. The diminished steam pressure results in expansion; the blade openings and the shaft diameter are all made larger in stages towards the exhaust. The number of expansions is usually four in high pressure, eight in low pressure T., Fig. 5 showing the variation in blades in the last expansions of a low pressure engine. To secure end and balance

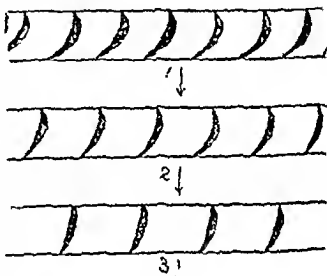


FIG. 5

of the T. shaft at all loads, dummy pistons are fitted, and thrust bearings provided to keep the shaft in correct

lengthways. The former, steam glands when the through the casing, are into which thin edged

touching dummy through the interior of the rotor to the exhaust end, the labyrinth resulting in the wire-drawing of any escaping steam and the production of a water seal. Bearings for high speeds are formed of loose-fitting concentric tubes round a central bronze bush, the spaces being filled with oil which finds its way in and forms an effective cushion. The blades, in the first few rows where the steam is at a high temperature, are of copper, the others being of a special brass alloy; they are highly polished to reduce friction. They are fitted into machined grooves and packing pieces, tightly caulked between; near the outer ends, which are thinned off finely, a brass wire is threaded through, and the blades

bound by copper wire. For all parts of the T. coming into contact with superheated steam, steel is used. Governing steam is admitted to the valve chest through a stop valve, and then through a runaway or emergency valve normally full open. The governor valve itself is of the balanced double-beat type, operated by a

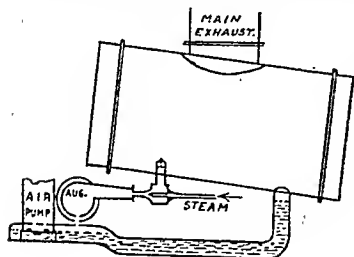


FIG. 6

steam relay controlled by a speed governor. The speed governor, driven by a worm and worm wheel mounted on the end of the main T. shaft, is regulated by hand to any desirable extent. A runaway governor, mounted on the same shaft as the speed governor, is connected to the runaway valve, and set to come into operation should the speed rise by 10 to 15 per cent. above normal. The whole action results in rapid blasts of steam being supplied to the nozzle, the flow being more nearly continuous the greater the speed of the

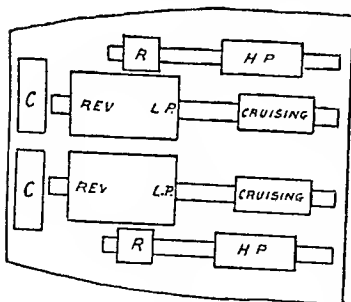


FIG. 7

T. An arrangement is often made for introducing steam at initial pressure at some later stage towards the exhaust. There is also an impulse-reaction type of T.; an impulse wheel containing one, two, or three rows of blades being mounted at the high pressure end of a reaction T. In the jets the steam is expanded down to 50 lbs. pressure and most of the super-

heat extracted. Other types are the exhaust steam T., driven by exhaust steam from high pressure reciprocating engines, and the mixed pressure steam T. The latter has been fitted with gearing which reduces from 2000 revolutions per minute to 70 r.p.m.; the former with gear reducing from 3000 to 300 r.p.m. Condensers differ little from those used with reciprocating engines, but the exhaust pipe is of large diameter to accommodate the highly expanded steam; in marine steam T. perforated baffle plates of steel or bronze are introduced. Large air and circulating pumps are used.

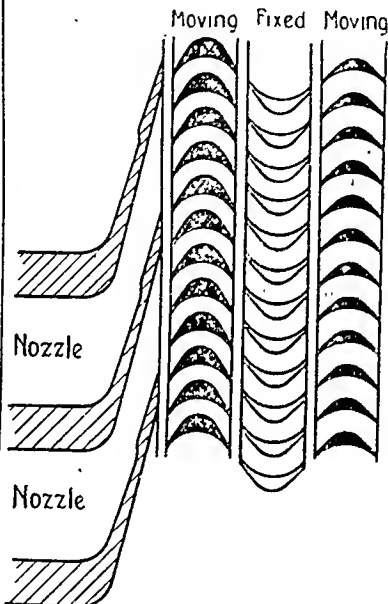


FIG. 8

A 'vacuum augmenter' has been designed by the Parsons Company to increase the vacuum over that obtained by means of the air pump. A small auxiliary is placed beneath the main condenser and connected by a pipe with a conical contraction through which a jet of steam is forced. This exhausts most of the air and vapour, delivering it to the air pump, while a dip in the suction pipe forms a water seal preventing return, Fig. 6. Most large T. steamers are, however, fitted with the 'Weir' dry air pump.

Marine steam turbines.—In 1897 the *Turbinia*, the first T. steamer, driven by three engines, high pres-

sure, intermediate, and low pressure, driving three shafts each with three propellers, attained a speed of 34.5 knots per hour. In 1900 the destroyer *Viper* attained 36.58 k.p.h. The first passenger vessel T. driven was the *King Edward* (1901), which made 20.48 k.p.h. The *Victorian* and *Virginian* of the Allan line were the first Atlantic liners so fitted, and with 12,000 i.h.p. developed speed of 17 k.p.h. The built in 1905 the *Caronia*, both of 21,000 i.h.p., the former a twin-screw quadruple expansion, the latter a triple screw T., with 4 low pressure engines, 2 ahead

the high pressure rotors there were 72 rows of blades and 6 expansions, the heights of blades being from $\frac{1}{2}$ to 5 in.; on the low pressure rotors, 36 rows, 6 expansions, blade heights $3\frac{1}{2}$ to 11 in. In an eight hours' trial at 23,000 h.p., on Oct. 9, 1906, the following figures were recorded: Steam pressure in boilers was 241 lbs.; initial pressure in high pressure, 157.5 lbs.; in the starboard and port Vacuum in the condenser and 27.47"; total h.p., 24,712; coal consumption per h.p. hour, 1.51 lbs.; speed, 21.25 knots. The arrangement in battleships or cruisers is shown in Fig. 7. At low or

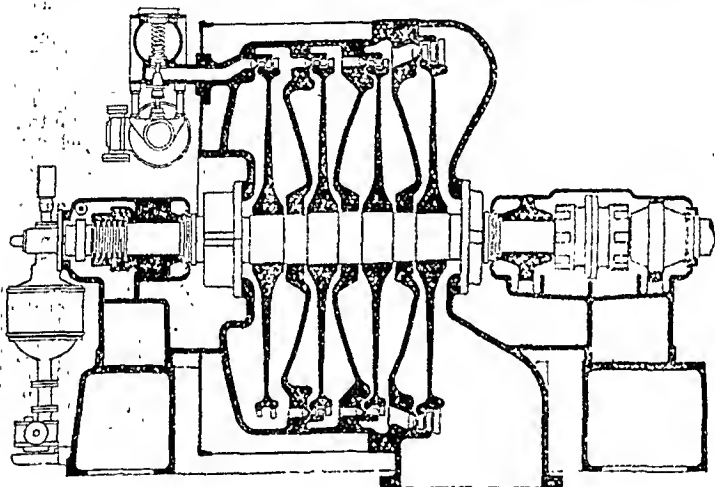


FIG. 9

(By permission of the British Thomson-Houston Co. (Rugby))

and 2 astern, and 1 high pressure ahead in the centre; the T. was the better by a nautical mile per hour, doing 21.6 k.p.h. on trial. The *Lusitania* and *Mauretania*, of the same line (1906), made a quadruple screw T. of 67,000: ended a forced pressure ahead, 2 low and 2 reversing T. sure rotors are 188 in. in diameter, the largest blades being 22 in. height (see *Engineering*, Aug. 2 Nov. 8, 1907). Both vessels capable of an average speed of practically 26 k.p.h. The first battleship driven by T. was the *Dreadnought* (1906), fitted with 1 high ahead, 1 high pressure astern, 1 low pressure ahead, and 1 cruising;

moderate speeds the coal consumption is less with reciprocating engines, but at high or maximum speeds the saving by T. is sometimes as much as 20 per cent. Ocean steamers with T. compare favourably, river and channel with these fitted engines. Cruisers less show a coal saving, 2.2 at cruising speed, this being much below that of reciprocating engines for similar vessels. Carried out tests against three other similar vessels with triple expansion engines; the result in each case was 3000 i.h.p. for 21.7 knots at 14 knots coal consumption the same; at

18, the *Amelhyt* showed a saving of 20 per cent.; at 20 knots, nearly 30 per cent.; at higher speeds still more. The *Amelhyt*, moreover, had a radius of action of 3160 nautical miles at 20 knots as against 2140 by the others.

Curtis steam turbines.—This firm has favoured the *impulse* type, obtaining efficiency at relatively low speeds by means of 'velocity' and 'pressure' stages. Fig. 8 shows the arrangement and form of nozzles and buckets, each row forming a velocity stage, part being absorbed in each. With no appreciable difference of pressure throughout the buckets, there is little or thrust in the shaft and no tendency to leakage of steam across the clearance space, which can thus avoid the danger of 'stripping.' Fig. 9 shows the 'pressure' stages, in this case four, the distribution of pressure being regulated by the size of the exhaust opening in each section, which also forms usually the nozzle for the next section. The sections are separated by steam-tight diaphragms carrying the nozzles, each one of which is so designed to utilise one quarter of the total steam energy from initial to exhaust pressure, thus allowing comparatively low speed of rotation.

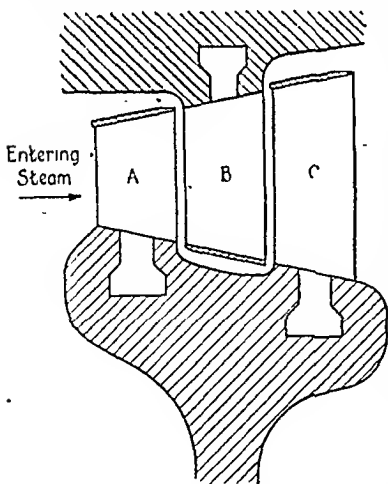


FIG. 10

Both nozzles and buckets increase in size with increasing volume due to each expansion. Fig. 10 shows a single stage in diagram, A and C being the line of moving, B of fixed buckets, the gradation allowing for increased expansion with falling velocity. By expanding the steam in the

nozzles, the first section of blades is not subjected to the high temperature of the superheated steam. The design of the machine allows room for substantial wheel bosses and efficient diaphragm packings; in addition it is claimed that a shorter length of T. is obtained than in any other case. The moving buckets are of special bronze section, highly finished; they are dove-tailed into the periphery of the wheels and their outer ends covered and fixed by riveting on a shroud ring.

Governor.—This is of the centrifugal type and carried on a vertical shaft driven by a worm and worm-wheel from an extension of the main T. shaft. It controls a small balanced pivot valve admitting oil under pressure to one side or the other of a rotary piston in a servo-motor, which is the real agent in controlling the main steam control valves, Fig. 11. Each control valve admits steam to a small group of nozzles in the first stages, and the opening and closing successively of several valves keeps a steam belt proportional to the load. The governor is adjusted to control the steady speed of the T. within $2\frac{1}{2}$ per cent. from 0 to full load; and a hand wheel adjusts the compression of a balancing spring allowing a variation of 5 per cent. above or below normal running. The motion of the governor is transmitted through the floating differential line to the piston valve admitting to one side of the rotary piston and closing the exhaust on the other. A cam is actuated by the shaft from the rotary piston, and operates poppet valves admitting steam to separate sections of the first stage nozzle of the T. An emergency governor cuts off steam should speed become excessive. The T. are also supplied for utilising *exhaust* steam at low pressure from existing reciprocating engines, and also as *mixed pressure turbines* for utilising in addition steam at high pressure from the boiler. In these latter, special high pressure nozzles are provided, which come into action automatically if the exhaust steam supplied falls to too low a pressure. The Curtis T. is also constructed with special governing devices for utilising steam at low pressures when the supply is at high pressure. The energy usually lost in a reducing valve can thus be usefully employed, and the T. also made to deliver the steam at the required low pressure. Many other types of steam T. are in use, notably the Rateau, Melins and Pfonninger, Zölly, Reidlor-Stumpff, Schulz, and the 'Brush.' The Rateau is of the 'exhaust' type, being used in conjunction with reciprocating engines; a chamber con-

taining a pan of water over which the exhaust steam passes forms a regulator or accumulator, absorbing or delivering parts, such as piston, slide valves, rods, etc.; steam is supplied direct to the shaft, which may be considered

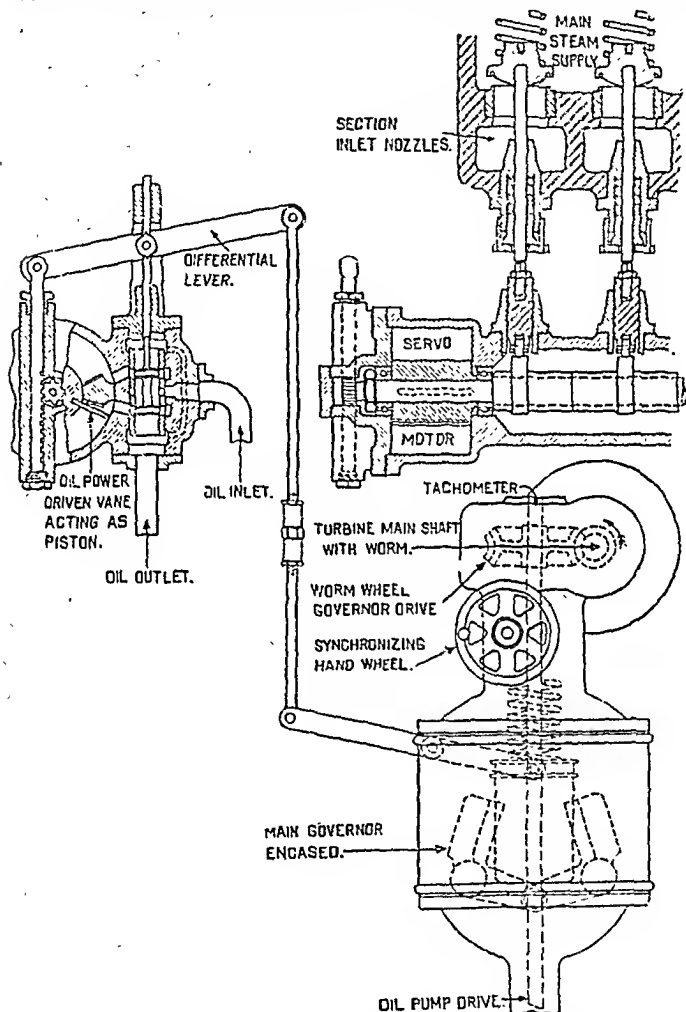


FIG. 11

(By permission of the British Thomson-Houston Co. (Rugby))

voring steam as the exhaust pressure rises or falls. The T. is largely replacing the reciprocating engine as a prime mover. It has fewer working

which without loss of

break-down, less weight of machinery for the same power. The machinery is more compact, better balanced, and for marine work can be placed well down in the vessel. Vibration is practically nil, and at high speeds coal consumption is less. See Dr. A. Stodola, *The Steam Turbine*, 1905; Professor Jamieson, *Steam and Steam Engines, including Turbines and Boilers*; A. Jude, *The Theory of the Steam Turbine*; R. M. Neilson, *The Steam Turbine*, 1908; A. C. Thomas, *Steam Turbines*, 1907; W. Gentsch, *Steam Turbines*, 1906; Byles, *The Steam Turbine as Applied to Marine Purposes*, 1906; Garnett, *Turbines, Steam and Water*, 1906; J. W. Sothorn, *Marine Steam Turbines*; Dr. G. Bauer and O. Lachic, etc., *Marine Steam Turbines* (trans. M. G. S. Swallow); Stevens and Hobart, *Steam Turbine Engineering*, 1906.

Turbot (*Rhombus maximus*), a flat fish, which, like the herring, a member of the same genus, has the eyes on the left side, the ventral eye being anterior to the dorsal. It has no ordinary scales, but pointed tubercles scattered in the skin. It is a shallow-water fish most abundant on the North Sea trawling grounds.

Turenne, Henri, Vicomte de (1611-75), a French general, second son of Henri, Duc de Bouillon, and of Eliza-both of Nassau. In 1630 he was sent by his mother as a hostage to the French court, in order to avert the designs of Richelieu against the sovereignty of his brother, the Duc de Bouillon, still a minor. T., whose reputation for military science had preceded him, was, though only nineteen, appointed to the command of a regiment of infantry. He distinguished himself at the siege of La Motte in 1634, and was appointed *maréchal-de-camp*. In 1635 T. was attached to Cardinal de la Valette who was to co-operate with the Swedes in Germany against Spain, and T. distinguished himself in the disastrous campaign that followed. In 1639, after some further service on the Upper Rhine, he was sent to Italy, second in command to the Comte d'Harcourt. T. was now ordered to Germany, where, during the winter 1643-44 he succeeded, by raising money on his own credit, in re-equipping the army which had been raised by the Duke of Weimar, and restoring its discipline. When the disturbances broke out at Paris, at the commencement of 1649, T. rejected the overtures of Mazarin, but, finding that resistance would be vain, retired to Holland with some of his personal friends. T. returned to Paris in May 1651, and having as he said discharged his duty to Condé by procuring his release from prison, de-

clared for the regent and Mazarin; and accepted in 1652 the command of the royal army. From 1653 to the conclusion of 1659 T.'s genius for war found ample scope in the campaigns in the French and Austrian Netherlands, which were concluded by the treaty of the Pyrenees. He fell near Sasbach, July 26, 1675, while preparing to lead his troops into action.

Turf Laws, see HORSE RACING.

Turgai, a prov. of Russian Central Asia, general governorship of the steppes. The territory covers an area of 169,832 sq. m. It has a dry climate, and the chief crops are rye, wheat, oats, barley, and potatoes. Salt is obtained from the lakes, and there are oil-works, tanneries, and flour-mills. Pop. 617,200.

Turgan, a tn. of Turkestan, situated S. of one of the largest chains of the Tian-Shan Mts. Pop. 10,000.

Turgenev (Turguenev, Turgenev, or Turgeneff), Ivan (1818-83), a Russian novelist, born at Orel, of a dilapidated noble family, educated at Moscow, St. Petersburg, and Berlin. Incurring the displeasure of the czar, he left Russia in 1855, the rest of his uneventful life being spent at Baden and Paris with the Viardot-Garcia family. In Paris, where he lived after 1870, he became exceedingly popular, and it was through the medium of French translations that his works first became world-famous. His chief novels, to give the names of Mrs. Constance Garnett's very fine English translation (14 vols. 1894-97), are: *Sportsman's Sketches*, an exposure of the utter wretchedness of Russian serfdom (1846); *A House of Gentlefolk* (1859), *On the Eve* (1859), *Fathers and Children* (1862), his three finest works; *Smoke* (1867) and *Virgin Soil* (1877). Although his novels abound in typically Slavonic realism and depression, T. must be regarded as the greatest Russian novelist. Fatalist and sceptic, he is yet free from cynicism, bitterness, or violent pessimism. As stylist and psychologist alike, he is perhaps the greatest prose-poet of human suffering. See Hammont, *La Vie de Tourguénieff*, 1910.

Turgot, Anne Robert Jacques (1727-81), a French statesman and economist, born in Paris, where his father occupied in turn various of the highest municipal positions. He was destined for the ecclesiastical profession, but felt that he could not enter this state of life without hypocrisy. He, therefore, studied law, in which from the beginning he showed remarkable capacity. After holding various minor appointments, he was, in 1761, appointed intendant of

Limoges, a province whose prosperity was then at the lowest ebb. On the death of Louis XV., a wider field was opened for his enlarged and beneficent policy, and he was rapidly raised to the position of Controller-General. By a series of enactments, some of which were repealed immediately after his removal from office, he aimed at destroying the servitude of the peasant class and at removing the

the townsmen who had lived by these abuses—nobles, courtiers, financiers, farmers of the revenue—now united in a conspiracy against him which Louis XVI. was too weak to resist. In 1776, having held office for only twenty months, he was dismissed. For the rest of his life he lived in retirement, devoting himself to physics and mathematics, literature and poetry. He published various works on economics and literature. See Lavergne, *Economistes français au 18^e siècle* (1870), and Lives by Condorcet (1786) and Neymarek (1835).

Turin (It. *Torino*, ancient *Augusta Taurinorum*): 1. A prov. of Piedmont, N.W. Italy, 3951 sq. m. in area. Pop. 1,213,709. 2. Cap. of above and chief city of Piedmont, at the junction of the Dora Riparia with the Po, 78 m. W.S.W. of Milan, in a fertile plain surrounded by the Alps. It contains an ancient castle and several modern palaces, a 15th-century cathedral, and the mausoleum (Superga) of the House of Savoy near by. Its university (founded 1404) is the chief in Italy next to those at Naples and Rome. There are fine museums, picture-galleries, and academies. Among its monuments are the Moie Antonelliana (finished in 1889 as a museum in honour of Victor Emmanuel II.), the Mont Cenis Tunnel monument erected to its end, the Crimean monument, the Cavour (1873), Amadeus VI. baldi, and Duke Emmanuel bert. T. is of great strategic importance and a good railway. The chief manufactures are and fabrics of all kinds, leather, glass, and machinery, important under Amadeus V. (1418) and the succeeding Dukes of Savoy, it was held by the French from 1506-62, and again in 1640, 1706, and 1798. After Marengo (1800) it was annexed to France, became capital of Sardinia (1814-60), and of all Italy (1860-65). Pop. 427,733. See Promi, *Storia dell' antica Torino*, 1869.

Turkestan, a tn. of Russian Central Asia; 176 m. N. of Tashkeed. Has a citadel and the mosque and tomb of Azret. Trades in hides and wool. Pop. 15,000.

Turkestan, means, etymologically, the land of the Turks, but to-day at least this is not a true description, as in Western or Russian T. the Kirghis and Turkomans together make up the comparatively sparse population of 6,250,000, whilst the 1,200,000 inhabitants of Eastern or Chinese T. are quite half of them nomadic. Geographically, T. describes those regions of Central Asia which are shut in by Siberia to the N., Mongolia and the wide desert of Gobi to the E., Tibet, India, and Afghanistan to the S., and westward by the Caspian. Russian T., which has an area of 400,770 sq. m., is now subdivided into the provinces of Ferghana, Syr-Daria, Semirchensk, and Samarkand. The Alai and the Trans-Alai, 'the ramparts of the Pamirs,' the Ala-tagh, and the Tian Shan are the highlands to the E. and S.E.; the last range completely dwarfs the Alps, and individual summits in T. rise as much as 23,000 ft. above sea-level. The Amu-Daria (or Oxus) and the Syr-Daria (or Jaxartes) are the chief rivers and are respectively 1500 and 1350 m. long. The country is interspersed with steppes, deserts, salt marshes, and great lakes like Lake Aral and Lake Balkash, which are fast shrinking in consequence of rapid desiccation. Silk, cotton, grapes, melons, and tobacco are the chief products from the many fertile oases like that of Samarkand (80,706 inhabitants). Tashkent, the capital (201,191) in Syr-daria, and Kholikand (112,428), Namangan (61,388), and Andijan (74,316) in Ferghana, as well as Samarkand, are one and all important entrepôts for carpets, spices, silks, cottons, and indigo, etc. Eastern T., also called Upper Tartary, Little Bokhara, and by the Chinese Siakiang, is a high

land, with an area of 1,000,000 sq. m. Roughly speaking, it is an area of which is barren province is composed of Karakoram and the Gobi wastes, which guard it from the outer world. The climate is extremely continental, and blinding sandstorms are continually sweeping over cities and silting up lakes and the beds of streams. Wheat, barley, maize, and tobacco, etc. are plentifully grown in the lowland oases. Higher up are excellent pastures for sheep and horses. Khotan (40,000 inhabitants) and Kashgar (33,000), the capital, are famed for their orchards. Other important cities are Yarkand (100,000) and Kulja (150,000), which

are important trading centres for caravans passing to and fro from China, Russia, and Western T.

Turkey: *Geography*.—T., or the Ottoman Empire, now comprises European T., T. in Asia, and the vilayets or provinces of Tripoli and Barca (Benghazi) in N. Africa. All that is left of European T. is a narrow strip of the Balkan peninsula, stretching across from the Black Sea to the Adriatic and confined on the N. by Servia and Bulgaria; on the E. by the Black Sea and the Bosphorus; on the S. by the Sea of Marmora, the Aegean Sea, and Greece; on the W. by the Ionian and Adriatic seas, and on the N.W. by Montenegro and Bosnia. T. in Asia is now the true centre of gravity of the empire; it includes Anatolia (the great plateau of Asia Minor), the lowlands of Mesopotamia, the highlands of Kurdistan and Armenia, a coastal strip in N.E. and W. Arabia, and the Island of Samos. The total area of the empire has been estimated at 1,565,000 sq. m., only 65,350 of which lie in Europe. The following is a sketch of the geography of T. in Europe (for a description of the other parts of the empire, the reader is referred to Asia Minor, Tripoli, Syria, etc. The island of Crete is practically independent of Turkish rule). T. in Europe is a mountainous country. The Rhodope Mts., or Despoti Dagh (highest point Rilo Dagh, 9000 ft.), are a formidable barrier between eastern Thrace and western T., so that the one line of communication is along the coastal plain. The wild and inaccessible highlands of Albania in the W., which reach their greatest elevation in Schar Dagh (9000 ft.), form part of the Dinaric Alps. On the Grecian frontier in the S.W. is the Pindus range. The chief rivers are the Maritza and Vardar. The former discharges into the Aegean, and is navigable as far as Adrianople, where it is joined by important affluents, and where, moreover, the highways over the Balkan passes converge. After cutting a passage through the Despoti Dagh spurs, it distributes its waters over Eastern Roumelia. The Bosphorus, which guards the approach to the Black Sea from the Sea of Marmora, and is at the same time the focus of all maritime trade between the Mediterranean and Russia, etc., as well as of the overland routes from Europe into Asia Minor, has fitly been likened to a tortuous river valley over whose wooded banks are scattered forts and towers, cities and villages, castles and parks. The southern gate of the sea of Marmora is the Dardanelles, which gives an opening into the Aegean. The climate is variable. Thus in the

mountainous regions tropical summers are followed by almost Arctic winters. The weather is much more equable along the sheltered valleys of Albania, whilst on the Aegean shores it may fitly be described as balmy and sub-tropical as well as equable. The soil is remarkably fertile, but owing to the primitive methods of cultivation and to the indolence of the inhabitants the yield is not nearly so great as it might be. In Albania cherries, apricots, and apples are profitably grown, whilst on the slopes of the sunny southern valleys are groves of lemons and myrtles, palms and olives, oranges and figs. Beautiful rose gardens flourish up and down the Maritza valley, and mountains and hills are clothed with beech, ash, lime, and oak forests. Little toil is needed to raise abundant crops of maize and barley, wheat, rice, cotton, and tobacco. Albania is noted further for its wool, sheep-rearing being an important industry, and also for its silk and honey. The upland pastures are freely used for stock-farming. In spite of antiquated methods, the fisheries are very profitable, and those of the Bosphorus alone are worth more than £250,000. Minerals are still quite undeveloped, what little mining there is being controlled by foreign capital; yet there is every reason to believe that iron, lead, and other metals exist in plenty. Some chrome ore is annually exported. Manufactures are equally backward and hand-loom cotton weaving is almost the only one of importance, though there are silk factories both in Constantinople and Salonica, and there is still some traffic in shawls, leather, and the world-famous carpets. The chief exports for the year 1906 in order of value were cocoons, mohair, figs, coffee, raw silk, barley, and opium, whilst the imports for that year were sugar, flour, rice, linen, petroleum, coffee, woollen stuffs, and cashmere. For 1910 the total value of goods exported was estimated at £16,378,602, and of goods imported at £30,043,300, both these figures showing a slight decrease on the corresponding estimates for 1908. T. does most trade both in imports and exports with Great Britain, and next with France and Austria-Hungary. She received in 1910 over £5,000,000 worth of cotton goods from the United Kingdom, this being more than five times as much as the amount of woollen goods, which, however, come next on the list. We depend largely on T. for Angora goats' hair, barley, and raisins. It should be noted that the above statistics refer to the whole of the Ottoman empire and not merely to T. in Europe. In

shipping the record of T. is no better than it is in the industrial world. In 1911, 963 sailing vessels and 120 steamers comprised the whole mercantile navy. Indeed, the carrying trade is practically in the hands of foreigners, especially of the British, Greeks, and Italians. According to the tonnage statistics for vessels entering Constantinople, the home shipping is not a twelfth of the British.

Internal communications.—The railways have made great strides in recent years. Constantinople is now in direct communication with Salonica and Monastir by means of a coastal line and with Sophia, Nisch, and Belgrade by means of a line passing up the Maritza Valley, through Adrianople and Philipopolis, and thence over a pass between the Balkans and Rhodope Mts. Salonica is further united with Uskub and Mitrevitza. Improvement schemes for railroad connections are now (1913) under consideration. There is an electric tramway service in Salonica. The postal and telegraphic services are a long way behind those of other European countries, and foreign nations still find it necessary to maintain their own post-offices in the large towns and ports. The roads are disgracefully neglected, and are so bad that whole districts are prevented from sending their products to the markets.

Defence.—The peace strength of the army is estimated at 375,000 for all arms and ranks. Military service has long been compulsory on Moslems, but since 1909 Christians have been allowed to serve, and as the latter exceed the former in European T., the military responsibilities of the Moslems have been very considerably lightened. Liability to serve lasts for twenty years, the recruit passing into the first line or 'Nizam,' and thence to the second line or 'Redif,' and finally for two years into the 'Mustafiz.' In the 1910-11 budget £6,971,012 was voted for the war ministry. The navy is now being reorganised under British officers. In 1911 there were three dreadnoughts, seven pre-dreadnoughts, three cruisers, eight effective destroyers, and fourteen torpedo-boats. Adrianople is the principal fortress. Constantinople is protected by the lines of Chokmedjo and Salonica by batteries. Dardanelles and Bosphorus are both fortified.

Population and towns.—In Europe there are over 6,000,000 people, this being a little less than a quarter of the total number of inhabitants in the empire exclusive of such nominally subject states as Crete and Egypt). Of the towns by far the most populous is the capital, Constantinople (1,200,000), whilst after it come

Adrianople (83,000), which by reason of its central position in the Maritza valley commands an extensive inland commerce, Midia, and Gallipoli, the chief port on the Dardanelles.

Constitution and government.—The whole empire is split up into vilayets or provinces. Thus the vilayets of Janina, Scutari, and part of Monastir form the somewhat savage Albania; that of Kossovo in the N.W. corresponds with Old Serbia; Macedonia is made up of the vilayets of Salonica and the rest of Monastir, which contain some of the best mineral and agricultural wealth of T. in Europe, whilst so-called Eastern T. is divided into the vilayets of Adrianople and Constantinople. Sanjaks, as, for instance, the Sanjak of Novi-Bazar, which lies between Serbia and Montenegro and was long subject to a military occupation, are district towns which are villages.

been the only form of government practised in T., for the excellent constitution decreed in 1876 by Sultan Abdul-Hamid II. was set down on paper and that was all. After various civil upheavals and revolutions consequent on shocking and persistent misrule, an attempt was again made in 1908 to build up a fresh constitution on western lines, that is with a Senate and a Chamber of Deputies, having a large electorate composed of citizens of all races and creeds, and with recognition of freedom of worship, freedom of the press, etc. In 1839 a complete code of laws was drawn up on the basis of the Napoleonic code, and this is administered by the 'Nizamic' courts, whilst the Sheri courts deal with the majority of civil suits. The true bedrock of Turkish law, however, is the 'Koran' and the 'Hadith,' which likewise contains the judgment

Religion, race

established

though in Eu

2,500,000 Moslems to 3,500,000 Christians. Among the latter Orthodox Greeks, Armenians, Roman Catholics, and others who are under the Exar etc., pro-

domi Jews. The want of uniformity in religion is perhaps the gravest obstacle in the way of building up a consolidated and homogeneous empire, and side by side with this deficiency may be noted the violent cleavages consequent on the multiplicity of races which are to be filled up to allow of a truly national T. Thus

both the Greeks and Albanians are soverally as numerous as the Turks themselves. These races compose some 70 per cent. of the total population, the remainder being made up of Slavs (Bulgarians and Serbs), Rumanians, Cherkesses, Armenians, Jews, Gipsies, and Circassians. Education is still only rudimentary, the majority of the well-educated Turks being sent abroad to school. The elementary schools, which theoretically at least must be attended by all boys from six to eleven years of age, and by all girls from six to ten, are free and under government control. In 1900 a university for Constantinople was planned. Secondary education is given by the grammar schools, one of which exists in every capital of a vilayet.

History.—The history of the Ottoman empire, at least so far as it touches the Balkan peninsula, is confessedly a barren record. It was by military conquests that the Ottomans secured a European foothold, and it was thus that the empire reached such splendid dimensions in the 16th century. But in time success disarmed them, and soldierly virtues decayed. Like the Median and Persian empires of old, the dominions of the Sublime Porte began to crumble away, so that there seems every likelihood that the intruding Turk—for so he has always been regarded by Western peoples—will on some future occasion be driven across the Bosphorus to whence he came. Incomprehension of his quality, he has shown himself incapable of coping with the huge task upon which, in the 15th century, he thoughtlessly embarked. He came with a gift, the gift of Islamism, and when this was rejected he had nothing else to offer. His highest merits, namely, his valour and religious fervour, have been the instruments of his undoing. For his inevitable and persistent appeal to the sword, whenever his will was questioned, created an insurmountable barrier to all friendly intercourse between himself and the conquered races, whilst the very excess of his fanaticism compelled him to treat the Christians, and indeed all save his brother Mussulmans, as inferior beings who in refusing the Koran had laid themselves open to every condemnation and contempt. In the 7th century the Turks first emerge from other tribes of the Turanian stock, and their story opens with the significant fact of their conversion to the Mohammedan faith. Little of consequence is told about them after this until Togrul Beg, the leader of a

branch of Tartar invaders, who are always known as the Seljukian Turks, captured Bagdad in 1058. This was a climax to many victorious campaigns and led directly to the foundation of imperial power by the Turks in Asia, a power which is still vigorous and effectual in our own times. Cairo and Jerusalem fell before the successors of Togrul Beg, and soon the Turks were in possession of Asia Minor and the greater part of Syria. But the Seljukians could not maintain the integrity of their speedily-won empire against the repeated assaults of the Crusaders and soon they pass into oblivion, their place being taken by the stronger and nearly-related tribe of Ottomans. These latter, who like the Seljukians took their name from a warrior chief (Othman), soon overran all the Asiatic provinces that had once been within the confines of the Roman empire, and by the middle of the 14th century had already made some headway in Europe. About 1253, when an emperor of the Palaiologoi dynasty was still weakly upholding the tottering fabric of the Byzantine empire, there was civil strife in the capital and one faction rashly called in the Tartars to their aid. The invitation was eagerly accepted, and like the Saxons of this country so the Ottomans made the appeal for aid a pretext for prosecuting their own conquests and for winning new territory for their own expansion. Hadrianople submitted to their sultan, Amurath I. (1360-89) in 1361 and soon the proud city of Constantinople and a few outlying and scattered dependencies were all that were left of the once mighty empire of Constantine. It was Amurath who remodelled the Janissaries and first used these troops with such remarkable success. This body of soldiers was at first composed of Christian captives, and when their number was no longer sufficient to recruit the force the sultan proceeded to exact as a toll from the Christians every fifth male child. From this tributary band the best and bravest were trained for a soldier's career, and when they grew up were drafted into the Janissaries, which rank with the Pretorians of Rome and the Giants of Prussia as one of the finest and best-disciplined bodies of infantry the world has ever seen. To return to the days of Amurath: when he died he was succeeded by his son, Bajazet I. (1389-1403), who also proved a great conqueror. In 1396 he gained a signal victory at Nicopolis (in Bulgaria) over the allied armies of Germany, Hungary, and France, and 'the flower of the Christian chivalry of Europe' was crushed under the foot of the Mohammedan interlopers. The

victory roused the gravest alarms throughout Western Europe and Constantinople seemed a doomed city. Indeed Bajazet had actually begun the siege of that coveted stronghold when the victories of the Mongolian chieftain, Tamerlane (Timour), forced him to cross the straits in haste to save his Asiatic dominions from this new aggressor. The issue was decided on the field of Angora (1402). Bajazet suffered an ignominious defeat and became the captive and sport of his insolent rival till death released him in 1405. But the advent of Tamerlane only deferred and could not stave off the downfall of Byzantium. In 1421 the Ottomans made an unsuccessful assault, and finally Mohammed II. encamped outside the city in 1453 with an army of 200,000. The resistance was weak, and the Turks were soon flocking as victors within the walls. Constantine XI., the last Byzantine emperor, died sword in hand, and the hoisting of the crescent of Islam upon the dome of St. Sophia was an ominous sign that the influence which had stood, however faintly, for Christianity and culture was no more. Greece was subjugated by the Ottomans between 1456 and 1460, just as Servia had been subjugated in 1389 after the battle of Kossova and Bulgaria by Bajazet in 1396, and just as Macedonia was annexed in 1430. Thus the Ottoman swallowed up the Eastern empire, but it was not yet swollen to its full glory. Mohammed, the victor of Constantinople, succeeded in penetrating with his standards into Italy, and for one year (1480) the city of Otranto (in Calabria) was under Ottoman sway. Selim the Inflexible (1512-20) overran the islands of the Archipelago, took possession of the whole of Syria (1515), obliged the Abbasside Caliph of Cairo to surrender his jurisdiction, and finally annexed Egypt after defeating the Mamelukes (1516). Probably the empire attained its period of greatest splendour during the reign of Solymán the Magnificent (1520-66). This warrior-king captured Belgrade in 1521, and in the following year expelled the Knights of St. John from Rhodes, notwithstanding they made a gallant, nay, heroic, resistance. In 1526 he inflicted an overwhelming defeat on the Hungarians, whose king, Lewis II., died on the field of battle, and in 1529, after humiliating Vienna by a protracted blockade, he marched with a huge army against Germany. That country was then in the throes of religious dissensions, and it was only the gravity of the crisis and the call of patriotism which induced Catholics and Protestants to

unite, and so provided Charles with a formidable army, before which Solymán prudently retired. Still for the time being a great part of Hungary became Turkish domain, and at Buda a Turkish 'Pasha' was actually installed. Further, the authority of the sultan was almost supreme in the Mediterranean, and it was under his protection that the pirates of Algiers terrorised merchants and sailors and kidnapped Christians to sell them into bondage. Charles' brilliant seizure of Tunis (1535) was a serious check to Ottoman influence in the S. After the death of Solymán, who was the last of the great soldier-sultans to leave the empire greater than he found it, there were only two fresh acquisitions of importance, namely, Cyprus, which was wrested from Venice in 1571, and Crete, which finally passed into Turkish hands in 1669 after Candia, the capital, had withstood a siege for over twenty years. From the last quarter of the 16th century dates the gradual but steady decline of the sultan's supremacy. Already, however, the commonwealth of Venice on the Adriatic and northward the kingdoms of Hungary and Poland had proved redoubtable buffers between Christendom in the W. and the lands of Islam in the E. As early as 1456 John Huniades of Poland had repulsed the Turks from Belgrade, but the first serious disaster which overtook them was the annihilation of their fleet in the Gulf of Lepanto (1571) by the combined squadrons of Philip II. of Spain and the Venetians. This victory put an abrupt stop to Ottoman encroachments in the

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 of the Turkish wars continued to be waged with Hungary and Venice. The Emperor Leopold of Austria incurred the hatred of his Protestant subjects in the former kingdom by his persecutions, with the result that they appealed to the Porte for aid. The latter readily complied, and in 1683 the Turks were once more at the gates of Vienna. This time the capital was rescued by the opportune arrival of Sobieski, king of Poland, and the Duke of Lorraine. The following year the Venetians cast in
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 which concluded this war (1699), confirmed this conquest to the Venetians, and also secured Hungary for the Austrians. Herzegovina was ceded

by Leopold to T. A second struggle between the House of Hapsburg and the Porte was terminated by the Peace of Passarowitz (1718), when the former received Belgrade and part of Bosnia and Wallachia. T. had won back the Peloponnesus in 1718, and Belgrade was recovered in 1739. By this time a new and more dangerous enemy, namely Russia, had arisen and was pressing hard upon the north-eastern frontiers of the empire. At first the latter more than held her own, but when the energetic Catherine assumed the reins of power, fortune veered to the opposite side. There was a natural bond of union between the Slavs of Russia and the kindred peoples of Bulgaria and Servia; whilst Catherine and her successors taught the Christian subjects of the Porte to regard Russia as their champion and to revive the Eastern Church, which had so long lain almost lifeless at the foot of its Mohammedan supplanter. The long series of Russo-Turkish wars began in 1730. By the Peace of Kainardji (1774) the sultan relinquished his suzerainty over the Tartar Khans of the Crimea and Russia secured the approach to the Black Sea for which she had so long been scheming. The Treaty of Jassy (1792), which closed a second war, was equally favourable to Catherine, for the northern boundary of the Ottoman empire was pushed back to the Dniester. In 1807, the year of the Treaty of Bucharest, this boundary was put still farther S., as far as the Pruth. Twenty-one years later Nicholas I. of Russia declared a fourth war on his now inveterate foe. Already his forces had crossed the Balkans and reached Adrianople, and would in all likelihood have closed in on Constantinople had not England and Austria adopted the rôle of peace-maker and emphatically forbidden Nicholas' further march southward. This campaign was concluded by the Peace of Adrianople (1830), the chief provision of which was the recognition by the Porte of the complete independence of Greece. Nicholas, indeed, had carefully timed his invasion so as to reap full harvest of the sultan's embarrassment consequent on the Grecian insurrection. For the Greeks, eager to become a nation as of old, had risen in revolt. But though they made a plucky resistance, they would assuredly have succumbed to their barbarous oppressors had not the great powers—England, France, and Russia—come to their assistance and vanquished the Ottoman fleet at the memorable battle of Navarino (1827). The Crimean war of 1853-56 grew out of Czar Nicholas' ambition to parcel out

the Turkish empire, and in so doing to secure the major share, the Balkan peninsula, himself. But the sultan blunted the edge of Nicholas' intention to pose as champion of his 10,000,000 Christians by issuing a firman, whereby he himself guaranteed to them the free exercise of their religion. Moreover, England and France, glad perhaps of an excuse to damage Russian prestige, willingly proffered their assistance. The will of the allies was recognised in the Peace of Paris (1856); the integrity of the sultan's empire was for the moment maintained, and the Christian subjects were put under the wing of the Great Powers instead of Russia; Nicholas failed to touch Constantinople, 'the key to the Russian house,' and the fate of the 'sick man' (Turkey) was designedly left a moot question. The whole 19th century is blackened for T. by interminable revolts. In 1798 Napoleon easily overcame the Mamelukes of Egypt, who were nominal vassals of T., but it was not till 1879, the year of the establishment of the dual control of France and England, that Turkish overlordship in that province finally came to an end. The broad movements for independence in Italy and Germany no doubt infected the Balkan states with the same longing for a national life. During the Greek war of liberation, 40,000 inhabitants were massacred in Chios (Scio), and in 1860, 3000 Christians were put to death at Damascus. Unheard-of barbarities were practised in Bulgaria during the rising of Herzegovina, Bosnia, and the other Balkan states (1876), whilst Europe is still aghast at the atrocities perpetrated against the Armenians in 1895. When the latter seized the Ottoman bank in Constantinople (1896), this act of violence was made the pretext of a renewed outbreak of fanaticism and cruelty, and in Pera, Trebizond, Gurun, and Diarbekrete the unfortunate people were the victims of wholesale slaughter. In 1877 Russia once more adopted the leadership of a Pan-Slavonic movement, and came forward as the defender of the unhappy Christians. Once more foreign interference alone stayed the Russian advance on the capital, and the short campaign was brought to an end by the famous Berlin treaty (1878), which was drawn up by the Great Powers acting in concert. By this agreement the independence of Bulgaria, Servia, Rumania, and Montenegro was formally acknowledged. Bosnia and Herzegovina were occupied by Austria, and Cyprus handed over to British control. Eastern Roumelia, whilst being retained by

the sultan, was given an 'administrative autonomy' under a Christian Pasha. Servia, it should be noted, had been more or less free since 1807 when Kara or Black George won fame as her deliverer, and the sturdy inhabitants of the mountain fastnesses of Montenegro had been virtually free from the Ottoman yoke since 1696. Moldavia with Jassy, and Wallachia, with Bucharest as its capital, had coalesced into the single kingdom of Roumania in 1861. Cyprus demanded union with Greece as early as 1895, and in 1908 Crete, which was evacuated by Turkish troops in 1898, declared its affiliation with the same state.

There remains only to refer to the feeble and, as it now appears, too tardy movement of the Turks towards reform and the adoption of Western government and practice. As long ago as 1839 a body of progressive measures, entitled the 'Hatt-i-Sherif,' was promulgated, and Christians were at last admitted to office in 1849. Riots in the capital and the miserable condition of tumultuous unrest which prevailed in all the European provinces extorted from the sultan another and enlightened political constitution in 1876, and Midhat Pasha (d. 1884) devoted a strenuous life to the furtherance of liberal ideas and progress. But the new constitution never took effect, and remained nothing more than a piece of parchment until the Liberal party rose in a body twenty years later (1896) and demanded its so-called restoration. In April 1897 war broke out between T. and Greece, but in a few months the latter were worsted, and only saved by the interference of the great powers, which led to peace being signed at Constantinople in December of the same year. Later, the growing abuses of the government resulted in the formation of what is known as the 'Young Turk' party, which included in its ranks some of the most influential men in T., who urged the crying need of reform. The movement was, however, partly suppressed in 1901. Seven years later the 'Young Turks' again agitated for the attainment of their ends, this time with more effect, as the sultan opened a new parliament, with Ahmed Riza, one of the leaders of the movement, as president. In 1909 the sultan was deposed, and his brother was called to the throne as Mohammed V. There had previously been trouble with France over the hinterland of Tripoli and with Bulgaria in regard to the 'liberation' of Macedonia, riots and bloodshed occurring in various parts of the country, which ended in martial

law being proclaimed in Constantinople. In 1908 Bosnia and Herzegovina were annexed by Austria, and in 1909 Bulgaria's claim to independence was accepted. In 1911 Italy forcibly seized Tripoli, and after a year's desultory fighting T. was obliged to sue for peace, as fresh trouble was brewing nearer home (see BALKAN WAR). The first Turkish parliament was dissolved in 1912, and a fresh cabinet was created the same year. The treaty of London was signed on May 30, 1913, which left T. with only a small strip of territory in Europe, extending from Midia on the Black Sea to a point near Central Thrace on the Aegean. Owing, however, to quarrels between the allies, negotiations concerning which are still pending, Bulgaria may have to give back part of her conquered territory, and thus T. may receive twice as much territory as she had left her under the treaty of London.

Literature.—Like the early Latin poetry, the literature of the Osmanlis is almost wholly one of imitation, and just as Terence and Plautus sought inspiration from the old Greek writers of comedy, so the primitive Ottoman poets drank most deeply from the well of Persian verse. From Persian poets they borrowed their forms, their style, and their theme. Ahmed Pasha (d. 1496), a vizier of Mohammed II., freely plagiarised the popular 'ghazels' of the Persian Nava'i (d. 1500). Fuzuli of Bagdad (d. 1555), one of the first of Ottoman poets, is admired above all for the tender beauty of his *Divân* or collection of ghazels, and it was this vehicle (the ghazel) which the versatile Nâbi (d. 1712) chose when he wished to reproduce the didactic and philosophical strain of the Persian Sâib (d. 1677). The brilliant panegyrics of Ne'î of Erzerum (d. 1634), whose light in the history of Turkish poetry shines as brightly as that of Fuzuli, are expressed in the form of the 'kasida' or lyric of Arabia. Both the ghazel and the kasida are Persian in origin, but the former is a do- was ten- and of the first couplet reappears in each alternate line. The *Khusrev* and *Shirin* of Sheykh of Keremiyân (d. c. 1440) was a romance in verse, dealing with an old Persian story and written like the elaborate and prolix Iranian epics, from which it was copied, in the conventional 'mesnevî' or rhymed couplet. In style again Ottoman writings reveal the merits and demerits of their Persian prototypes. They are mannered and insincere, and tainted with that artificiality

which invariably infects a court literature. Far-fetched conceits, extravagant word-painting, and a stereotyped phraseology continually obscure what are often fine thoughts.

The same faults are apparent in the prose history of Sa'd-ud-din (d. 1599), entitled the *Crown of Chronicles* (*Tāj-ul-Tevārikh*), where the excess of rhetoric pals and where that favourite embellishment known as the 'sej,' which consists in rhyming the last words of successive clauses, produces a jingle which falls unpleasantly on Western ears. Finally, the imitation of Persian models is equally apparent in subject-matter. Ottoman poets, like their masters, never sang the song of battle, though they belonged to a race pre-eminently war-like, but devoted themselves rather to the composition of countless love-lyrics and odes to spring, as well as to the other joys of nature. There is a light-hearted spontaneity in the ghazels and kasidas of Nedim (d. 1730), which lifts him on to a plane of conspicuous originality, though his elegant diction and grace are clearly Iranian in origin, but the *Husn-u-Ashk* (*Beauty and Love*) of Shcykh Ghūlib (d. 1798), though it is justly esteemed as one of the finest allegories in the language, bears every trace of the contemporary revival of Persian domination. Space allows only of the mention of two other writers, and they are Shinasī Efendi (d. 1871) and Hamid Bey, a leading representative of the infant school of playwrights. In the last century a revolution was effected in literature as in the political world. Western and especially French modes of thought filtered into the capital, and the new school of writers have gone back to a simplicity and naturalness of style more suited to their modern outlook.

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Turkey (*Meleagris*), the name for two American species, the largest of the game birds. *M. gallinago*, the origin of the domesticated varieties, formerly occurred throughout the N. American continent, and was abundant in the United States, in parts of which it is still hunted with greyhounds. The wild birds are both larger and more ornate than domesticated Ts., which, however, have been much improved by introductions of wild blood from time to time in recent years. The largest of the domesticated varieties is the American mammoth bronze, the plumage of which is a beautiful dark bronze with a red metallic lustre. Among other varieties are the white, buff, slate or lavender, and black. *M. ocellata*, the other species, occurs in Honduras, and possesses plumage of great brilliancy with ocellated or eyed tail feathers.

Turkey-buzzard, see VULTURE.

Turkey-red, see DYEING—*Alizarin* colouring matters.

Turkistan, see TURKESTAN.

Turkmanshai, a tn. of Azerbaidjan, Persia, 65 m. S.E. of Tabriz. It was the scene of a treaty in 1828 ceding a large part of Armenia to Russia.

Turkomans, or Turkmenians, a branch of the Turki race, inhabiting W. Turkestan and N. Persia. They are chiefly nomad shepherds and are all Mohammedans, mainly of the Sunnite sect. They appear to be an offshoot of the Uzbeks, who reached the Caspian in the 14th century, and several dynasties in Asia Minor, Persia, Syria, and Egypt sprang from them. See Baker, *Clouds in the East*, 1886; Vambery, *Travels in Central Asia*, 1863.

Turk's Islands, see CAICOS, CAYOS, OR THE KEYS.

Turmeric (*Curcuma longa*), a plant with long leaves and a spike of pale cream flowers, a native of Ceylon, and extensively cultivated in India for its rhizomes, which when dried and ground yield a yellow dye. It is also used as an ingredient in curries, and has various uses in Hindu medicine. T. paper is an unsized paper dipped in an alcoholic solution of T., and is used as a test for alkalies.

Turnberry Castle, a ruin on the W. coast of Ayrshire, Scotland, on the Firth of Clyde, said to be the birth-place of Robert Bruce.

Turnbull's Blue, a blue pigment, ferrous ferrieyanide, which is precipitated by the action of potassium ferrieyanide on a ferrous salt. Its

composition is represented by the formula $3\text{Fe}(\text{CN})_2\text{Fe}(\text{CN})_6$.

Turnebus, Adrien (1512-65), a French classical scholar, born at Les Andelys, Normandy. He studied at Paris, and in 1547 became professor of Greek and Latin there. He enjoyed a great reputation, Montaigne being amongst his friends and contemporaries. He wrote theological and critical treatises, and translated the Greek and Latin authors. See *In Turnebi, Obitum Nænia* (1651), by Passeray.

Turner, Charles Tennyson, see TENNYSON, CHARLES.

Turner, Joseph Mallord William (1775-1851), a landscape painter. The son of a barber, he was born in London, and in 1789 he entered the Royal Academy School, where he became intimate with Girtin. In 1798 T. exhibited several pictures at the Royal Academy, and four years later he was made an academician; while in 1807 he began the publication of his *Liber Studiorum*, this consisting of a set of 19. In 1805 he went to Italy, while in 1831 he visited Scotland, having been asked to illustrate a new edition of Sir Walter Scott's poems. The following year he lived at Venice, while in 1836 he went a second time to France; but the closing years of his life were spent mainly in London, and he died there. He was buried in the crypt of St. Paul's Cathedral, and, in accordance with his will, the National Gallery acquired a large array of his oil-paintings and over a thousand of his sketches. The Municipal Museum, Glasgow, also contains a number of his works, while there is a fine collection of his water-colours in the National Gallery of Scotland. T. possessed pre-eminently the gift of capturing and rendering transitory effects of light, and his triumph herein proved a vast inspiration to the Barbizon school, and afterwards to the impressionists. The most important study of his art is that embodied in Ruskin's *Modern Painters*, but the reader should likewise consult *The Exhibited Works of Turner*, by C. F. Bell, and *The Engraved Work of Turner*, by W. G. Rawlinson (1913).

Turner, Sharon (1768-1847), an Anglo-Saxon historian, born in London. Wrote *History of England from the Earliest Period to the Death of Elizabeth* and *The Sacred History of the World*, and carried on valuable researches among original Icelandic and Anglo-Saxon MSS.

Turner, Sir William (b. 1832), an English surgeon, born at Lancaster. He is the editor of the *Journal of*

Anatomy and Physiology, and has published numerous papers on human and comparative anatomy.

Turning, the process of cutting and shaping wood, metal, and other material by causing it to be rotated in a lathe, while a tool is held against it. The tool is rigidly fixed for the time being with its shaft at right angles to the surface of the material. Tools are made with faces at various angles to suit different kinds of material and to produce different modes of cutting effect.

Turnip, or *Brassica rapa*, a biennial cruciferous plant grown for its thick fleshy root both as a garden and as a farm crop. Ts. are classified according to their shapes, Long, Tankard or Spindle, Round or Globe, and Flat. Another classification is according to the colour of the flesh. White-fleshed varieties are of rapid growth and produce much bulk in a short time, but their feeding value is low and they are liable to be injured by frost. The yellow-fleshed varieties are of slower growth, but are of superior feeding value and keep better during winter. They are probably hybrids between the T. and the Swede (*Brassica rutabaga*) which is most obviously distinguished by its neck or collar.

Turnpike Roads, see TOLLS.

Turnsole, a name for various heliotropic plants, including the genera *Heliotropium* and *Helianthus*.

Turnstone, or *Streptopelia interpres*, a shore bird allied to the plovers and so called from its habit of turning over stones and shells on the seashore in the search for marine insects and small crustacea. It is widely distributed, but breeds chiefly on Scandinavian coasts, and only visits Britain in the winter. It is about 9 in. long. The upper parts are chestnut with black spots, and the lower parts white, except on the breast.

Turnu-Magurelo, the cap. of the dept. of Tolcorman, Roumania. Is a river-port and trades in grain. Pop. 8700.

Turnus, the son of Daunus and Venilla, and King of the Rutulians when Æneas reached Italy. He was stirred up by Hera's commands to oppose Æneas, and appears in Virgil's *Æneid* as a brave warrior. He was slain by Æneas. Livy and Dionysius also mention him.

Turnu-Severin, the cap. of the dept. of Mehedinți, Roumania, on the l. b. of the Danube. The old town, named from the tower forming the head of Trajan's bridge, was destroyed in the 15th century, and the present one was founded 1835-41. Trades in live stock, cereals, and petroleum. Pop. 18,628.

Turpentine

Turpentine is obtained by cutting the stems of pine trees or Coniferae and collecting the sap which flows out. It consists of a solution of resins in a liquid called 'oil of T.' Distillation in steam causes the essential oil to pass over, a residue of 'colophony' (violin resin) being left behind. Oil of T. is a colourless liquid (sp. gr. .86, boiling point 158-160° C.) which is not constant in composition or physical properties, but varies according to the species of pine from which it is obtained. It is insoluble in water, but is an excellent solvent for phosphorus, sulphur, iodine, and resins, and is, therefore, used in the preparation of paints and varnishes. The oil is used in medicine externally as a counter-irritant.

Turpin, Archbishop of Rheims, friend and companion of Charlemagne—such are the names and qualifications assumed by the author of a chronicle in Latin prose, narrating the expedition of the Frankish emperor against the Saracens of Spain. It seems to have sprung out of the epic ballads and traditions of the Carolingian heroes, but through the legendary manner in which they are told there is visible a monkish aim—viz., to encourage the foundation of churches and monasteries, the undertaking of religious wars against the Saracens, and, above all, the pilgrimage to San Jago de Compostella. The chronicle has been printed in Roubertus's edition of the *Scriptores*, but see more particularly Ciampi, *De Vita Caroli Magni et Rolandi Historia*, J. Turpino vulgo tributa.

Turpin, Richard (Dick) (birth variously stated at 1706 and 1711, hanged 1739), a brutal highway robber whose daring exploits on his mare 'Black Bess' have secured for him in the eyes of posterity an almost purely legendary renown (see Harrison Ainsworth's romance of *Rookwood*). T. was the son of an Essex innkeeper, and began his predatory career by cattle-stealing when apprenticed to a butcher (see Wheatley, *London, Past and Present*). Ultimately tried and convicted at York for horse-stealing and hanged.

Turquoise, or Callaité ($\text{Al}_2\text{O}_3 \cdot \text{P}_2\text{O}_5 + 5\text{H}_2\text{O}$), is a blue or bluish-green mineral which is in great favour as a gem. It is reniform or stalactitic, never crystallised, has a waxy lustre, and is feebly translucent or opaque. (Hardness 6, sp. gr. 2.7.) On placing in hydrochloric acid the blue colour disappears. The best specimens for gems are obtained in Persia, other good localities being India, Tibet, Arabia, and Saxony. See also STONES, PRECIOUS.

Turr, Stephen (1825-1908), a Hun-

garian general, born at Baja. He joined the Italian forces and fought several times against the Austrians. He took part in the expeditions of Garibaldi, and afterwards was appointed general and governor of Naples. On his return to Hungary he became engaged in public works, and in 1881 commenced the boring of the Isthmus of Corinth.

Turret (Lat. *turris*, a tower) is used as the diminutive of tower, but the diminutive is used not absolutely, but in comparison with the size of the main structure. Ts. are frequently attached to one or more of the angles of a tower, and contain a winding stair leading to the roof.

Turretin, Francis (1623-87), born at Geneva, studied with great distinction under Spanhoim, Morus, and Diodati; and was ordained pastor at Geneva in 1647. Having removed, in 1650, to fill the pastorate of Leyden, T., in 1653, was invited to Geneva to be professor of theology. His celebrated *Institutio Theologiae Elencicae* made his name known in regions far removed from Geneva. The whole *Opera* of T. were published at Geneva in four volumes the year after his death.

Tursellinus, Horatius, or Orazio Torsellino (1545-99), an Italian Jesuit, rector of the Jesuit seminary at Rome (1579). He wrote *De Vita S. Francisci Xaverii* (1594), *De Usu Particularum Latini Sermonis* (see Hand's ed. 1829), and *Epitome Historiarum a Mundo Condito ad Annum 1598* (in Italian). See *Bibl. Brit.*; Moréri, *Grand Dict. Hist.*

Turtle, see TORTOISE.

Turtle Dove, or *Turtur communis*, a summer visitor to Britain, which it leaves about Michaelmas to winter in Africa. It is from 12-13 in. long, with a long, much-rounded tail. The plumage is greyish brown with yellow on the sides of the head and pink on the neck and breast. The back of the neck and crown are greyish blue, and the legs and toes are red. Two pure white eggs are laid in a rough structure of twigs placed in a tree near the ground. The male assists the female in incubation, and their devotion is proverbial. Another species is the collared T. (*T. risorius*), which is the dove most commonly kept in captivity.

Tuscaloosa, a city of T. co., Alabama, U.S.A., 55 m. S.W. of Birmingham, on the l. b. of the Black Warrior R. It is the seat of Alabama University. Has cotton manufacturing and lumber-mills. Pop. (1910) 8407.

Tuscan Order, in architecture, one of the five Roman orders recognised by the Renaissance writers. It was a late form of the Doric.

Tuscany (It. *Toscana*, ancient *Etruria*), a region comprising the S.W. of the N. half of Italy, bordering on the Mediterranean, bounded N. by Emilia, E. by Umbria and the Marches, S. by Rome, W. by Liguria. Most of the country is hilly, containing that part of the Apennines known as the Apuan Alps. The marshy Maremma (850 sq. m.) in the S. was drained by Leopold II. early in the 19th century, and now affords pasture to horses and cattle. The Arno is the chief river, united to the Tiber (E.) by the Chiano Canal. There are eight provinces, the total area being 9304 sq. m. Florence, Leghorn, Pisa, and Pistoja are the chief industrial centres. Chianti and Montepulciano wines, oil, grain, flowers, and silk are produced. There is much mineral wealth, and hot springs abound. The Tuscan language became the literary language of Italy. Under the Medici Florence was of supreme importance in T. A grand-duchy of T. was formed (1569); from 1737 it was under the House of Hapsburg-Lorraine, and became part of Italy (1861). Pop. 2,694,706. See Repetti, *Dizionario Geog. . . della Toscana*, 1834-46; Zobl, *Storia Civile della Toscana*, 1850; Von Reumont, *Gesch. Toscanas*, 1876-77; Robiony, *Gli Ultimi dei Medici*, 1905; J. Ross, *Old Florence and Modern Tuscany*; and D. N. Lee, *Scenes and Shrines in Tuscany*.

Tuscaroras, a tribe of N. American Indians, driven out of N. Carolina in 1715 by the settlers, and of Iroquoian stock. In the War of American Independence they divided, some fighting for, others against, the English. The remnant of them, numbering about 700, is now divided between reservations in Canada and Ne.

Tusculum, an ancient tn. of 12 m. S.E. of Rome, said to have been founded by Telamon, son of Odysseus. The modern Frascati is close to the site. From the battle of Lake Regillus (497 B.C.) till the Latin War of 340 B.C. it remained faithful to Rome. It was settled again 335 B.C., and from that time followed the fortunes of Rome.

Tuskar Rock, situated off co. Wexford, Ireland, 7 m. N.E. of Carnsore Point, and has a lighthouse.

Tussaud, Madame Marie (1760-1850), foundress and proprietress of the wax-work exhibition in London, born at Bern, Switzerland. Studied art under her uncle in Paris, and was appointed drawing-mistress to the ill-fated family of Louis XVI. Came to England in 1802 and settled in London, where her exhibition became, and still is, one of the most popular sights of the city.

Tusser, Thomas (c. 1521-80), an English poet and writer on agriculture, educated at Eton and Cambridge. He served Lord Paget as a musician for ten years, dedicating to him his *Five Hundreth Poymes of Good Husbandrie united to as many of Good Huswifery*, 1573. An autobiography in verse is prefixed. See Payne and Herrtage's reprints (1878).

Tussilago, a genus of composite plants. *T. farfaria* is the coltsfoot, a common plant, the yellow flower-heads of which go to seed before the large downy leaves appear.

Tussock Grass, or *Dactylis caespitosa*, a tall-growing grass, native of the shores and sand dunes of the Falkland Isles. It has been introduced into Britain, and in a few places is cultivated as a fodder for cattle. The name is also given to the tufted hair grass (*Aira caespitosa*).

Tussock Moths (*Dasychira*), a genus of moths, two species of which occur in Britain, the rare dark T. M. (*D. fascelina*) and the pale T. M. (*D. pudibunda*), a common moth of a greyish colour. Its caterpillar, which has a number of tufts or tussocks of hair, sometimes causes considerable damage to hops and forest trees.

Tuticorin, a seaport tn., Tinnevely dist., Madras, British India, 443 m. from Madras, on the Gulf of Manaar. The chief industry is cotton-spinning. Pop. 28,500.

Tuttilo, or Tuotilo, a learned Swiss monk of the 9th century, of St. Gall's convent, Switzerland, noted as a painter, sculptor, gold worker, musician, and an eloquent preacher. He died about 896 A.D. See Nagler's *Künstler-Lexicon*.

Tutor, in Scots law, the guardian of the person of the estate of a person under four-

teen and a female child under twelve. Ts. are either: (1) *nominate*, i.e., he who is named by the father or mother in a will or other document; (2) of *law*, i.e., he who succeeds by mere operation of law in the absence of nominate Ts. (seldom resorted to); or (3) *dativ*, i.e., he who applies where no T.-of-law demands the office.

Tuttlingen, a tn. in Württemberg, Germany, 38 m. S.S.W. of Reutlingen, on the R. Danube. Chief manufs. shoes, leather goods, and entlery. Pop. 15,862.

Tutuila, an island of the Samoan archipelago, in the Pacific Ocean, 40 m. S.E. of Upolu, and belonging to the U.S.A. Chief export, copra. Pop. 4800.

Tuxpan, a port in the state of Vera Cruz, Mexico, 5 m. from the Gulf of Mexico, and 148 m. N.W. of Vera Cruz. Pop. 16,440.

Tuxtla, the cap. of the state of Chiapas, Mexico, 40 m. W. by S. of San Cristobal. The chief industries are tanning and indigo. Pop. 10,239.

Tvachtri, or Tvashtri, in the *Rig-veda*, the Hephestus or Vulcan of Indian mythology, who shaped heaven and earth and forged the golden thunderbolts of Indra.

Tver: 1. A gov. of Central European Russia, between Novgorod and Moscow govts. It is on the S. slope of the Valdai Hills and watered (N.W.) by the Upper Volga, the W. Dwina, and the Msta. There is extensive forest-land in the N. Area 24,975 sq. m. Pop. 2,213,800. 2. The cap. of above, at the junction of the Tvertsa and the Volga, about 100 m. from Moscow. There is a 17th-century cathedral and an imperial palace built by Catharine II. Cotton and leather goods are the chief manufs. Boots and shoes, hosiery, sail-cloth, cordage, nails, and earthenware are produced. T. is an important river-port and the seat of a Greek archbishop. Pop. 59,083.

Twain, Mark, see CLEMENS, SAMUEL LANGHORNE.

Tweddell, John (1769-99), a famous English scholar, born near Hexham. Unfortunately, most of his MSS. were lost, and all that remains of his work is a selection of his private letters and his *Prousiones Juveniles*.

Tweed, a woollen fabric, manufactured in Scotland and Ireland (Harris and Donegal T.) and extensively worn. The name seems to be a corruption of 'tweel,' or 'twill,' used for materials which have parallel diagonal lines over the surface of the cloth.

Tweed, a river in the S. of Scotland, and draining most of the E. portion of the Scottish lowlands. It rises in the S.W. of Peeblesshire and flows in a north-easterly direction, between Berwickshire on the N. and Northumberland on the S., where it enters the North Sea. It has a total length of 97 m., and drains an area of 1870 sq. m. It is one of the best salmon streams in Scotland, but the fisheries are less important now than they were formerly. The traffic on its waters is chiefly confined to Berwick, and it is navigable only in its last 6 m.

Tweed, 'Boss,' see TAMMANY HALL AND SOCIETY.

Tweeddale, originally the name of Peeblesshire, Scotland.

Tweedmouth, a seaport of Northumberland, England, and a suburb of Berwick-upon-Tweed. It manufs. machinery and is engaged in salmon-fishing. Pop. (1911) 3500.

Tweedmouth, Edward Marjoribanks, Baron (1849-1909), an English

statesman, born in London and educated at Oxford. He became a barrister in 1874, and from 1880-94 represented Berwick in the House of Commons in the Liberal interest. In the latter year he succeeded to the peerage and was made Lord Privy Seal and Chancellor of the Duchy of Lancaster. In 1905 he was made First Lord of the Admiralty.

Twelfth-Day, the festival of the Epiphany, in commemoration of the visit of the three kings or magi to the infant Jesus, kept on the twelfth day after Christmas, Jan. 6. Many ceremonies used to be connected with Twelfth Night.

Twelve Patriarchs, Testaments of the, a series of writings purporting to give the dying speeches of the twelve sons of Jacob. Each speech develops into an exhortation to avoid some particular sin or practise some special virtue. It is a Jewish work of the 2nd century B.C., but early underwent Christian interpolation. It is referred to by Tertullian and Origen. See article in *Jewish Cyclopædia*.

Twelve Tables, or Duodecim Tabulæ, the earliest code of Roman laws, drawn up partly from existing laws, partly as new legislation by the decemvirs (451-449 B.C.). See *Livy*, iii. 31-37; *Cic.*, *De Leg.* ii.; *Rep.* ii. 37, 63; *Gaius*, *Dig.* x. 1; *xlvii.* 22, etc.; *Schoell's Legis Duodecim Tabularum Reliquiæ*, 1866.

Twickenham, a par. and tn. of Middlesex, England, on the l. b. of the Thames, opposite Richmond. Many eminent men lived here, including Pope, Sir Godfrey Kneller, and Horace Walpole. Pop. (1911) 29,374.

Twilight. The diffused daylight which precedes and follows the passage of the sun above and below the horizon respectively is due to refraction, reflection, and dispersion of the light of the sun by the atmosphere, chiefly by means of the dust and water particles contained. Its brightness varies with these conditions, but mostly with the distance of the sun below the horizon; when this exceeds 18° twilight ceases. Beyond the Arctic and Antarctic circles T. increases according to season, extending over many weeks in the spring and autumn. Owing to the increasing angle at which the sun approaches the horizon towards low latitudes, the duration of T. decreases; it decreases also with altitude. At Quito it is no more than twenty minutes.

Twill, a woven fabric in which the warp is raised one thread and depressed two or more threads for the passage of the weft.

Twillingate, a seaport tn., cap. of the Twillingate and Fogo dist., New-

foundland, 160 m. N.N.W. of St. John's. Pop. about 4000.

Twining, Thomas (1735-1804), an English div. He translated notes and assisted Burney in his *Hist. of Music*. Selections from his *Correspondence* were published as *Recreations and Studies of a Country Clergyman*, 1883. See Sandy's *Hist. of Classical Scholarship*, iii, 1908.

Twinkling, see SCINTILLATION.

Twiss, Sir Travers (1809-97), an English jurist and writer, professor of political economy at Oxford (c. 1842-47), and of civil law (1855-70). He was queen's advocate-general and knighted (1867), resigning all public offices (1872). His works include: *The Law of Nations*, 1861-63; *Monumenta Juridica*, 1871-76; *Belligerent Right on the High Seas*, 1884.

Tyburn, the name formerly applied to the Middlesex gallows, which stood at the W. end of Oxford Street. The last execution took place there in 1783.

Tyche, see FORTUNA.

Tycho, see BRAHÉ, TYCHO.

Tyldesley, an urban dist. of Lancashire, England, 10 m. N.W. of Manchester. The chief industry is cotton spinning. Pop. (1911) 15,582.

Tyler, a city in Texas, U.S.A., 100 m. E. by S. of Dallas. Has various manufs., and is situated in a prosperous agricultural region. Pop. (1910) 10,400.

Tyler, John (1790-1862), tenth president of the United States, born in Charles City, Virginia. He was called to the bar in 1809, and in 1811 he was elected a member of the Virginia House of Delegates. From 1816-21 he was a member of the national House of Representatives, and in 1825-27 governor of Virginia, becoming a senator in 1827, when he showed his hostility to a high tariff policy. In 1840 he was elected vice-president, succeeding Harrison the next year as president, in which capacity he stood as it were midway between the two great parties, without the support of either, for though he frequently showed himself in sympathy with the Whigs he was never wholly one of their number; the Whigs themselves refused to acknowledge him as a member of their party. Besides the Ashburton Treaty, the most important act of his administration was the annexation of Texas in 1845. His last years were devoted to the Confederate cause.

Tyler, Moses Coit (1835-1900), an American historian and scholar, born at Griswold, Connecticut. He was professor of English literature in the University of Michigan, 1867-81, in

which year he was appointed to the chair of American history in Cornell University, a position he held till his death. He published: *A History of Literature during the Period, 1878*; *The Literary History of the American Revolution*, 1896.

Tyler, Wat (d. 1381), an English rebel, was the leader in the rebellion of 1381. He led his followers, the men of Kent, on the road to London, releasing John Ball from prison at Maidstone. He then proceeded to Blackheath and burnt the prison at Southwark and plundered the archbishop's palace at Lambeth. Being met by Richard he demanded immediate redress of grievances, and while preparations were being made to effect this T. entered the Tower and murdered Archbishop Sudbury and Sir Robert Hales. He was, however, killed by the mayor, Sir William Walworth, the following day.

Tylor, Sir Edward Burnett (b. 1832), an English anthropologist, born in London. He travelled in America in 1855, and the following year visited Mexico, where he became interested in the prehistoric remains, and took up the study of the science. He recorded his observations in *Anahuac, or Mexico and the Mexicans, Ancient and Modern*, 1861; which

brano between the external and the internal ear, sometimes called the drum of the ear.

Tynan, Katharine, alias Mrs. Katharine Tynan Hinkson (b. 1861), was born in Dublin, and educated at a Drogheda convent. She began writing at the age of seventeen, and has published both novels and verse. Her reminiscences are about to be published (1913) by Messrs. Smith, Elder & Co., under the title *Twenty-five Years*.

Tyndale, William (c. 1490-1536), a translator of the Bible, was a native of Gloucestershire. In 1521 he became chaplain and tutor in a household at Old Sodbury in Gloucestershire, but his sympathy with the new learning aroused suspicion and he removed to London; but finding it impossible to complete his translation of the N.T. in that city, he went to Hamburg and ultimately to Cologno, where in 1525 he began printing. In 1528 he published *Parable of the Wicked Mammon* and the *Obedience of a Christian Man*, and was for a time in Henry VIII's favour, but having published *The Practice of Prelates* in 1530, he lost the king's good-will, and steps were

taken for his imprisonment. He was arrested for heresy, imprisoned, strangled, and burnt. His famous rests upon his translation of the Bible, consisting of N.T., Pentateuch, and Jonah.

Tyndall, John (1820-93), an English physicist, born at Leighlin Bridge, co. Carlow. From 1848-50 he studied at Marburg under Bunsen, and after taking his Ph.D. published, with Knoblauch, *On the Magneto-optic Properties of Crystals* (1850). He made important investigations in the Penryn slate quarries, and subsequently in the Alps with Huxley, the result of their labours appearing in *The Glaciers of the Alps* (1860). In 1859 he began his researches on radiation, and later took up the subject of the acoustic properties of the atmosphere. He was president of the British Association at Belfast in 1874, and for some years was scientific adviser to the Board of Trade and to the lighthouse authorities. Among his works are: *Mountaineering*, 1861; *Heat as a Mode of Motion*, 1863; *Radiation*, 1865; *Fragments of Science*, 1871 (6th ed. 1879); *Hours of Exercise in the Alps*, 1873; *Floating Matter of the Air*, 1881; *New Fragments*, 1892.

Tyndareus (*Τυρδαρεος*), in Greek mythology, was the son of Perieres and Gorgophone. He married Leda, by whom he was the father of Clytemnestra and Castor.

Tyne, a riv. of N. England, formed by the junction of the N. and S. Tyne near the village of Hexham, Northumberland, flowing E. to the North Sea at Tynemouth. Its total length is 45 m., and its principal trib. is the Derwent. Newcastle and South Shields are the chief tns. on its banks. The N. Tyne rises on the Scottish border, and the S. Tyne has its source near Crossfell in Cumberland.

Tynemouth, a municipal, co., and parl. bor., seaport and market tn. of Northumberland, England, on the R. Tyne. An important watering-place, its sands, about 1 m. long, are overlooked by picturesque cliffs. Shipbuilding is carried on, and there are important fisheries and rope and sail works. It includes N. Shields. Pop. (1911) 58,816.

Tynwald, a legislative body of the Isle of Man, which with the lieutenant-governor, the Council, and the House of Keys constitute the government. The Tynwald Court controls the surplus revenue and appoints boards to manage the harbours, highways, education, local government, and asylums, subject to the approval of the lieutenant-governor.

Type, in chemistry, a system used for indicating the structure of com-

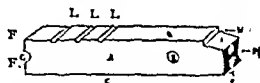
pound bodies, which were regarded as derived from several simple inorganic bodies by the introduction of various radicals. Gerhardt referred almost all substances to four typical molecules, viz. hydrogen, H_2 ; hydrogen chloride, HCl ; water, H_2O ; and ammonia, NH_3 . Kekulé added a fifth T., methane, CH_4 . Williamson introduced condensed Ts., and Frankland from the T. theory was led to the theory of valency (q.r.).

Type, in theology, some image prefiguring an antetype. The term is specially applied to the images found in the O.T. of the persons and things of the new covenant. In the Epistle to the Hebrews the comparison is fully worked out with reference to the Atonement.

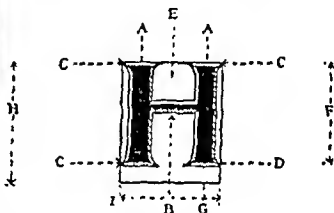
Type and Typefounding. As in the earliest days of most handicrafts the craftsman made his own implements and apparatus, so in the inception of typography the printer was his own typefounder, in fact it was not until the 17th century that the arts of printing and letter-founding were separated. In the second volume of *Mechanick Exercises*, by Joseph Moxon, 1683, is a very full and practical account of the making of type in his day, and the process remained much the same until the introduction of machinery for the purpose in the middle of the 19th century, and with some modifications in the mould is still to a minor extent in use for the casting of small quantities of little-used sorts. Before describing the mould it will be necessary to give some account of the matrix, from which the face of the type is cast, and the punch, by means of which the letter is stamped into the matrix. The punch is a rod of steel about 2 in. long by $\frac{1}{4}$ in. square for pica and smaller sizes, and upon the end of this the letter has to be engraved after the face has been ground true on an oilstone. The outlines having been marked out, the counters are struck in with counter-punches; as the work proceeds impressions are taken in smoke on a smooth paper and compared with the model; this refers to hand-cut punches, but towards the end of the last century machinery was introduced which produces the punches with an accuracy impossible in hand work. The matrix is a small oblong piece of copper, on one side of which and near one end an impression of the die is struck, after which the matrix requires careful adjusting that the impression may be of the correct depth and be in exactly the right position and in perfect alignment with the rest of the font. In hand casting the mould was made in two

equal portions, of wood lined with iron, and each size of body required a different mould, though the width could be regulated to the width of letter required. When the two portions of the mould are joined in position, with the matrix in its place, a small chamber is left, having for its base that portion of the matrix on which the latter has been struck, and at its top a small hole with a funnel-shaped opening, into which the metal is poured as each type is cast, when, with a peculiar jerk of the left hand, which holds the mould, the metal is sent right home to the deepest point in the matrix. When, on the metal cooling, which it does almost at once, the mould is opened, releasing the type with a tag of metal at the foot—the small quantity which was in the funnel-shaped opening of the mould—this has to be broken away, and afterwards a groove is cut across the bottom of the type where the tag had been. Type casting by machinery is treated together with type-casting and setting machines at the end of this article. The principal element in type metal is lead, varying from 89 per cent. in Moxon's formula to 55 per cent. in some modern ones, but the proportion is made to suit the size and character of the type to be cast. The other principal ingredients are tin and antimony, besides which, copper, nickel, cobalt, iron, and bismuth have been used. When it is considered that the smallest type runs not less than twenty-four lines to 1 in., it will be seen what accuracy must be maintained in the moulds to get the body of each type to the standard size, and in the matrices that the alignment of the face and the thickness of line may be constant. In the list of sizes of type given by Moxon ten only are given, and of these there are two groups of two, of which one is the double of the other, and one group of three, English, two line English, and great Cannon, where the latter equals four-line English, but there is no correspondence between the various groups. By the introduction from America of the point system, a method was adopted showing the relative sizes of all types, the point being fixed as the 72nd part of an inch, and sizes named by the number of points, thus effecting the standardisation of the depth of the types. The varying thickness or set of different letters is inherent in the alphabet we use; *i* and *v* must be cast on different thicknesses of body, but these are now being made proportional. In typesfounders' parlance each portion of a single type has its own name, and in the following block, whose length shows correct type

height, they are as follows: A, body or shank; B, belly or front; C, back; D, face; E, counter; F, feet; G, groove; H, shoulder; I, bevel or beard; K, pin-mark; L, nicks.



Type design.—Moxon was right in praising the Dutch typesfounders of his day for the 'mathematical regularity of their figures,' and 'the true placing of their fats and their leans, with the sweet driving them into one another, and indeed all the accomplishments that can render letters regular and beautiful, do more visibly appear in them than in any letters cut by other people.' The names of the various parts of the face of type, as shown in the accompanying block,



are: A, main stroke; B, hair line; C, serifs; D, line; E, counter; F, line to back; G, beard; H, body; I, set. In considering the beauty of type and its legibility there are various things to be taken account of: the correct placing of the line on the body, so that the beard may be deep enough for the descending letters, and in the lower case that the face of the short letters should leave just the right proportion of space for the ascending letters; that the italic, or any other face be *i* the bear and be that 'sweet driving of the fats and the leans into one another' that Moxon speaks of; and this latter characteristic should also be found in the joining of the serifs to the main stroke. Founts of type used for bookwork may be classed as the *old face*, the *old style*, of somewhat lighter face and more regular appearance, and the *modern face*; and with the roman of each of these faces there is the corresponding italic. Besides these faces used for bookwork there are very

many fancy faces used for jobbing work, such as circulars, bill heads, cards, and advertising purposes, and the above-mentioned, as well as the fancy faces, are made not only to the standard set or thickness, but extended or condensed. The standard thickness is judged by placing the whole alphabet, *a* to *z*, in line, when they should measure about $12\frac{1}{2}$ ems of their own body. Again, besides the letter faces of type there are chess and draught faces, playing card and dice faces, music faces, shorthand faces, and many others. The system of logotypes, or types bearing a combination of letters frequently occurring in conjunction, has been tried, notably that under the patent of Henry Johnson, which was adopted by *The Times* in 1782, but apparently was not found to be so great a success as was anticipated. Indeed, unless such a combination occurs more frequently than the least used of the letters, it cannot be a time-saving device. The logotypes actually in use are *fi*, *fl*, *ff*, *fl*, and *fl*. See C. T. Jacobl, *Printing* (5th ed.), and *The Times Printing Number*, 1912.

Type-casting and Type-setting Machines. When machinery was introduced for type casting, it was necessary to find some means of forcing the metal into the matrix, which in hand casting had been done by a jerk of the hand after the metal had been poured into the mould from the ladle, and the pump was introduced for this purpose in the early part of the 19th century. It was also obvious that if any speed was to be maintained it was necessary to cool the mould by some artificial means; the expansion of compressed air was recommended for this purpose by Brunel, but at the present time water is generally used. The earliest machines for casting type followed pretty closely the hand method, in that the mould was in two parts and was made to approach the nozzle of the pump, to recede from it when the metal had been delivered, to open and eject the type, repeating this action for each type cast. Such machines are still in pretty general use, with the mould working on a pivot to and from the pump, with various cams to effect the opening and closing of the mould and the delivery of the type when cast. They were originally worked by a hand wheel, but now are made to use power, the various actions being controlled by springs. The type turned out by the hand machines, however, needs finishing after delivery. The improved pivotal machines, worked by power and water cooled, now turn out the finished type ready for use at the

speed of 3000 per hour for pica or 7000 for nonpareil; of course, with the larger sizes of type the production is much slower, as the type in the mould takes longer to cool. The Wicks Rotary Type-casting Machine is a vast improvement on any previous type-caster, and is constructed on an entirely different principle. Its chief characteristic is the mould wheel, working on a vertical shaft, and having 100 radial moulds whose length is type height, their vertical measurement that of the body to be cast, and their width the set or thickness of the letter; at the end of the moulds towards the shaft are the matrices, which may be different in each mould; at the outer end is the aperture to receive the molten metal. With the revolution of the wheel each mould is presented in rotation to the nozzle of the pump and is filled with the metal. The pump consists of a receptacle in which four plungers work, and into it the metal is sucked through inlet valves, and from it delivered into a pipe fitted with a device for regulating the fluid pressure. As the wheel continues to revolve after leaving the nozzle, the matrices are gradually forced outwards from the shaft, pushing the type before them, till, when it projects from the wheel about $\frac{1}{8}$ in., it passes before a nicking saw which cuts the groove at the foot; after passing a little farther other nicks can be cut by a similar device as required. Having completed a half revolution the type is ejected on to a delivery chain, which is divided into grooves crossways by leaves, which rise to receive the type, which is held in place by a retaining cam to prevent its returning with the matrix as it recedes into the mould; from the chain the type is carried to the delivery galley, and the leaves of the chain then fall. According to the size of type to be cast, the mould wheel revolves from 5 to 10 times per min., thus accounting for from 30,000 to 60,000 per hour. *Type-setting machines* may be classified into three types: (a) Those that set type that has been cast by some other machine; (b) those that cast their own type in the order in which it is required for printing the special work in hand; and (c) those that assemble the matrices for a complete line and then cast that line in a single slug. The first mentioned is the earliest invention and, necessitating justification of the line by hand, has been very largely superseded by the machines of the other two types. Amongst this first class of machine may be mentioned the Thorne, the Pulsometer, and the Unitype. Of the second class of type-setting machines the *Lanston Monotype* may be taken

as an example. This machine consists of two separate parts, the keyboard, which perforates rolls of paper (a translation of the copy into a series of perforations), and the caster, which these perforations guide in its automatic working. The keyboard is similar to that of a typewriter, and the characters are arranged on the same plan, but it is double and contains 276 keys, but by an arrangement of different colours it is indicated whether they belong to roman or italic; caps., small caps., or lower case; figures or sorts. Above the keyboard is a strip of paper which is rolled from one spool to another $\frac{1}{2}$ in. at the completion of each letter. Behind the keyboard there is a series of 31 punches, 29 of these working singly and the other two in combination, their relative position indicating the character they represent; one key, the quad, does not perforate. The position of the key struck governs the single punch or combination of punches brought into use, and its depression actuates a valve on the supply of compressed air, which sets in motion the required punches. Whilst the perforations for a line of type are being made a device is counting the number of spaces, and at 5 ems before the completion of the line a bell rings, so that the operator may see if he can complete the word in hand or where he shall divide it, or if the word is completed whether the next will come in complete or divided; having included all that the line will contain, the line will need justifying. By pressing the key provided for the purpose the justifying drum rotates until it shows, by means of two figures one above the other, which of the keys upon the top and second row of keys, provided for the purpose, are to be used to effect the justification of the line, which is accomplished by the setting of two differential wedges which divide the surplus space over the number of spaces in the line. The perforated slip is now ready to go to the caster, where it is paid in from the end and works backwards, for it is necessary, as will be seen, that the justification wedges should be in place first or the spaces would not be cast off the correct width. The proper die-case, which consists of a frame 3 in. square, holding the 225 matrices in 15 rows of 15, being selected and put in place, the end of the paper strip is placed under the air pressure bar and the machine started. Under this pressure bar, which is supplied with compressed air, is a row of 31 holes leading by tubes into castings at the back and on one side of the die-case, in each of which works a

piston, two of which are forced upwards by the air from the pressure bar passing through the perforations proper for those particular pistons which serve to control the die-case when it has arrived in position to the exposed end of the mould, in which the letter is to be cast, in its correct sequence. Other air tubes set contain rods in motion, which result in casting spaces, which result in casting spaces, which result in casting spaces, and in into action.

Of the third class mentioned above the *Linotype* may be taken as typical. In this machine the matrices are small brass plates keyed at the upper end (for purposes of distribution, which will be explained later) with the matrix proper on one of its vertical edges, some having the same letter in both roman and italic, one below the other, on the same edge. The magazine in which the matrices are stored in the machine consists of a flat metal box sloping towards the front and having separate grooves for each character; the matrices tend to slide down these grooves, but are held in check by escapements until released by the action of their corresponding key on the keyboard, which has 78 keys on the same plan as a typewriter. As a key is depressed the corresponding matrix is released from its groove and carried by a travelling belt to a slotted assembly box, where it is joined by the others to complete the first word and then by a space band, followed in the same way by other matrices and space bands to the end of the line. When complete the line is carried by special mechanism to the face of a vertical mould wheel, through which is the mould proper for the body to be cast to, the matrices in lino forming the type face of the slug or linotype. Whilst here the space bands are forced upwards, thus forming perfectly equal spacing between the words and justifying the line. Behind the mould wheel is the pot of molten metal, which has a delivery mouth to fit against the rear face of the mould, and within the pot a mechanically-operated plunger, by which the mould is filled. The mould wheel then makes a partial revolution, turning the mould slot from horizontal to vertical; the linotype is then pushed out between trimming knives into the galley. The matrices are now mechanically raised and pushed on to the distributor bar above the back edge of the magazine, where they hang by the teeth of their keyed end, and are gradually drawn along it by revolving screws until each meets with the gap where none of its teeth has support, and so falls into its own channel.

The space hands from which the matrices were separated on their upward journey are also returned to their own box by mechanical means.

Typewriter, a writing machine operated by hand for producing characters similar to those of printing. The typewriter in its modern form was invented about 1870 by three men, Sholes, Glidden, and Soule, working together. Their experiments were financed by Densmore. Glidden and Soule retired from the experiments, and afterwards Yost was called in to express an opinion as expert mechanic. Acting on his advice Densmore and Sholes took the machine to the Remington Company, gunmakers, who had suitable tools for making such a machine economically. Remington's took it up and gave it their name; hence the Remington T. It is interesting to note that the three men concerned, Sholes, Densmore, and Yost, all invented other Ts. afterwards. There are about fifty writing machines of various kinds now being made. All Ts. for letter writing agree in having keys which are depressed by the finger, thereby setting in action certain levers and causing a letter to make an imprint on paper or other material. The imprint is made either directly on the paper, or an inked ribbon is interposed between the letter and the paper. The paper is clamped round a cylinder called the platen. The letters all strike one spot, so the paper must be moved after each letter is struck. It must move also to allow a space between the words; this is done by a spacing key. The platen is mounted in a carriage which is made to move in the direction of its length, and the platen is made to revolve in the carriage. The movement of the carriage is automatic, and is caused by a coiled tension spring attached to the end of the carriage, which is released every time a letter key or the spacing key is struck. It moves an equal amount each time, the amount being the space of one letter. On account of the spaces being equal, the letter 'i' has a space equal to the letter 'm.' This gives an irregular appearance to the words, and attempts have been made to devise a mechanism which will avoid this, but up to the present no satisfactory result has been obtained. The revolving movement of the platen is made when the carriage is drawn back by hand after the end of a line is reached. The mechanism causes the platen to revolve a certain fixed distance, and this distance determines the space between the lines. Usually there are three of these fixed

distances or spacings, called single, double, and triple spacing. The spacings are altered readily by an adjustable stop. Ts. are either (a) type bar machines, or (b) type wheel machines, according to whether the letter is mounted on a lever or on a cylinder. In (a) the key is struck with a staccato blow of the finger, while in (b) the key is depressed with a push action. Nearly all modern machines are of the (a) pattern; the Hammond and Blick are the best-known examples of the (b) pattern. In pattern (a) the mechanism consists of two or more levers, the striking letter being situated on the free end of the ultimate lever. In the Oliver machine the letter is situated on the bottom of a U-shaped bar. The U is inverted and the two ends are pivoted in bearings, which makes an exceedingly strong type bar and gives excellent alignment. In some cases the alignment is 'forced,' that is, the type passes through a hole (as in the Yost) or between guides (as in the Smith-Premier and Barlock). This produces good alignment, but if the type bar does not strike truly the result is either a faint impression or a strain on the finger of the operator. In pattern (b) the mechanism causes the type cylinder to revolve until the correct letter is in the proper position facing the striking point on the platen, and then the cylinder is thrust forward and the impression made. Of course, the whole operation is made by a single depression of the key lever. The great advantage of pattern (b) is that a cylinder may be removed in a few moments and another cylinder with entirely different type inserted. This gives a wide range of types on the same machine. The impression is made on the paper in ink. Machines are pad or ribbon machines. In pad machines the letter on the type bar takes the ink from the pad and impresses it on the paper; in ribbon machines an inked ribbon is interposed between the letter and the paper, and the impression is made by the letter striking the ribbon. The clearest writing is made by pad machines on account of the letter striking directly on the paper. The Yost is the best-known pad machine, nearly all others being ribbon machines. The ribbon is mounted on two spools which revolve automatically through a small arc when the key lever is depressed, so that the letter strikes a fresh part of the ribbon each time, otherwise a hole would be made in the ribbon after a few blows. When the ribbon is wholly unwound from one spool, a ribbon shift key reverses the motion and the ribbon moves in the opposite direction. The letters

on the keyboard are not arranged alphabetically, but an arbitrary arrangement has been adopted whereby the letters most used are in the middle and therefore directly under the fingers. Several arrangements have been suggested, the one now generally adopted being as follows:—

q w e r t y u i o p
a s d f g h j k l
z x c v b n m

The numerals, punctuation marks, and other figures are placed in different positions on different machines. The keyboards are single or double. In the single keyboard machine each type bar has two or, as in the Oliver, three letters affixed to it, and a shift key throws the carriage backwards or forwards in order to bring the paper in the correct position under the letter. The keys are marked with letters and figures similar to those on the corresponding type bars. In the single keyboard machine the key must be marked with the several characters which are affixed to the type bar, but the same letter stands for both capitals and small letters. In double keyboard machines each type bar has only one letter, and there is a key to each. A greater speed is obtained with the single keyboard machine as the fingers have to memorise fewer keys, and this more than compensates for the additional labour in depressing the shift key. Ts. are 'visible' or 'blind.' Until recently most machines were 'blind,' that is, the writing was made from below upwards, the letter striking the bottom of the platen, which made it necessary to lift the carriage in order to examine the writing. In the 'visible' machines the writing is done in sight and the ribbon must be removed immediately after the impression is made, which necessitates a ribbon throw mechanism. The general design of the T. seems to be fixed, but many small improvements are made, some being valuable, while others are merely 'selling points.' One valuable addition is a back spacer. The depression of a key throws the carriage back one space, so that a letter which has been written wrongly (the most frequent error in typing) or missed out can be corrected with the least possible waste of time. The platen is frequently made to revolve independently of the spacing ratchet, which enables the operator to write exactly on the date line. Tabulators are now incorporated with nearly all machines, and are indispensable for accountancy and suchlike work. The cutting of sten-

cils for duplicating work is an important function of the T., and the Oliver machine is pre-eminent in this respect on account of the type bar already referred to. When only a few copies of a letter or document are required, carbon paper may be inserted between sheets of writing paper, and in this manner as many as twelve copies of one original may be made with thin paper and carboas. Carbon copies are frequently used for office filing, thus taking the place of the letter book. The speed obtainable depends on the skill of the operator rather than on the make of the machine. An expert can write about 150 words a minute. The price of Ts. is very high compared to the cost of manufacture. A 'standard' machine costs £23 less 5 per cent., while the actual cost of making varies between £3 and £4. This is due to several of the largest firms combining to keep up the price.

Typha, a genus of aquatic plants with sword-shaped leaves and long cylindrical brown spikes of female flowers, surmounted by a slender deciduous spike of male flowers. *T. latifolia*, great reed mace, cat's-tail, or 'bulrush,' is a large and handsome plant, the down of which was formerly used in stuffing pillows and mattresses.

Typhaeae, a small order of aquatic plants, with only two genera, *T.* and *burweed*.

ERIC FEVER.

in Greek mythology, was a monster with a hundred heads who was subdued by Zeus and buried in Tartarus under Mt. Aetna, the workshop of Hephaestus. According to Homer, he was concealed in the earth in the country of the Arimi, which was lashed by Zeus with flashes of lightning. He was the youngest son of Tartarus and Gaia, and by Echidna became the father of the dog Orthus, Cerberus, the Lernaean hydra, Chimæra, and the Sphynx. He also begot the dangerous winds, and is sometimes called the father of the Harpies.

Typhoons, small cyclones occurring in the tropics, particularly in the China Sea, from July to November; as hurricanes they occur in the W. Indies. Normally the air of the tropical belt shows little cyclonic disturbance, since there is little differential rotational effect near the equator. When the belt, in following the sun N., reaches a region of rotational velocity of quicker diminution, the convectional currents take it up, and the storms generated travel westwards with a northerly inclination, and finally pass out into the westerlies before dissipating on a

N.E. course. Ts. are notable for the patch of clear blue sky in the central calm area, which is nevertheless dangerous to sailing vessels; these are unable to keep way in the midst of great waves, and may be struck again at any moment from any direction as the storm travels on. The rapid fall of the barometer gives short warning of approach, but the navigator may be sure in his calculation of wind direction and find the safest path. To sailing vessels they are very dangerous, but modern steamers can negotiate all but the most severe. In the China Sea and Gulf of Mexico they are of sufficient violence to give rise to 'tidal waves,' which are destructive to ports and shipping.

Typhus Fever (Gk. *τύφος*, mist or stupor), an acute contagious disease, characterised by a high fever, severe nervous symptoms, and a peculiar rash. It is undoubtedly caused by the action of a specific micro-organism, but, as in smallpox, mumps, measles, and whooping cough, the causative bacillus has yet to be discovered, though there are reasons why the *diplococcus exanthematicus* of Dubieff and Bruhl should be regarded as connected with at least some of the symptoms. The disease has been known in Europe since the 11th century. The conditions predisposing to the disease are poor hygienic conditions, over-crowding, starvation, etc. Researches by Prof. Matthew Hay appear to indicate that the action of fleas is a necessary preliminary to the disease, and that contagion is effected by flea-bites. The mortality has been estimated at about 18 per cent. of cases, but the rate depends considerably upon the facilities for proper treatment. The period of incubation is usually from seven to ten days, during which only a slight general debility is observed. The fever is ushered in with rigors, after which the temperature rises to 103° or 105°, attaining a maximum about the seventh day, after which it remains steady or gradually becomes lower. The tongue is first of all coated with a white fur, which afterwards becomes yellow or brown. The teeth are coated with sordes. There is usually a degree of constipation and the urine is scanty. At the fourth or fifth day the characteristic eruption appears. This consists of spots or blotches of rose colour, appearing chiefly on the abdomen and flanks; they are for the most part petechial in character, that is, they consist of subcutaneous effusions of blood. The patient is very feeble and generally in a state of wakeful stupor, staring with contracted pupils and diminished capacity for perception. The crisis, which occurs about

the fourteenth day, is marked by a fall in temperature, free perspiration, and amelioration of the distressing symptoms. The chief points involved in the treatment of T. F. are good nursing, fresh air, and a milk diet.

Tyr, in Norse mythology, a son of Odin, and god of war. His right hand is sacrificed in the struggle with the monster Fenriswolf, the son of Loke, in the great battle between the good and evil principles. He succeeds in slaying Garm, the terrible hound of the Gnipa cave, but receives his death-wound in the conflict. From his name is derived the word 'Tuesday,' through the Anglo-Saxon *Tiwes dæg*, Tyr's day.

Tyrannion (*Τυραννίων*), a Greek grammarian, a native of Amisus in Pontus, whose real name was Theophrastus. He studied under Hestiacus of Amisus and Dionysius the Thracian, and in 72 B.C. was taken captive by Lucullus, who brought him to Rome. There he occupied himself with teaching and in arranging the library of Apellion, which had been brought to Rome by Sulla. He was also engaged by Cicero, who speaks of him in the highest terms, on a similar task, and acted as instructor to Cicero's nephew Quintus.

Tyrant (Gk. *τύραννος*), a species of monarch among the ancient Greeks, the irresponsible dominion of one man. Men of courage and ability, not unfrequently members of the aristocracy, availed themselves of the discontent of the people in order to win popularity, and then with their help overthrew the existing authority and possessed themselves of the government. The Ts. exercised their authority often in their own interests, but when they did not misuse it the people on the whole fared better under the new rule than under the old, while it also served to remove existing anomalies, and to make room for fresh developments. Such tyrannies arose most commonly in the 7th and 6th centuries B.C., and many of the Ts. of this time have earned a high reputation by the impetus they gave to trade, commerce, and architecture, and by their encouragement of art. The dislike of monarchs in general, however, led men to associate the name of T. with the idea of a cruel and arbitrary ruler, and its modern bad meaning is also largely due to the ultra-constitutionalists of the 4th century in Athens, to whom the democracy of Pericles was the ideal of government.

Tyrant Birds, or *Tyrannidæ*, a large family of American birds resembling the shrikes in appearance and habits. During the breeding season, the males are remarkably bold and fierce. The

hill is long, with a hooked tip, the tail is slightly forked, and the wings are long and pointed. Tho birds are entirely insectivorous in habit, and some species cause considerable loss to bee-keepers.

Tyrconnel, Richard Talbot, Earl of (1630-91), born in Ireland. In 1687 was made lord-deputy of Ireland. He fought hard against the Protestant ascendancy, and when William raised the siege of Limerick, fled to France. to return in 1691 with small authority. He died the same year.

Tyre (modern *Sur*), an ancient tn. of Syria, built partly on an island and partly on the mainland. It was the principal seaport of the Phœnicians, and equally important when the Greeks became acquainted with it, but was sacked by Alexander in 322 B.C. and lost its former importance. It was, however, a flourishing port under the early Roman emperors, and a place of considerable importance in mediæval history, especially as the stronghold of the crusaders (1124-1291). But after the fall of Acre the Christians deserted the place, which was then destroyed by the Moslems.

Tyree, or **Tiree**, an island of the Inner Hebrides, Scotland, co. Argyll. Hynish in the S. has granite quarries. Pop. (1911) 1825.

Tyrol, or **Tirol**, the most southerly prov. of the Austrian empire, bounded on the S. S.E., and S.W. by Italy. It has an area of 10,307 sq. m., and is traversed from W. to E. by the main chain of the Alps, the loftiest peak being Ortler (12,802 ft.), which belongs to a group lying S.W. of the Adige on the frontier of Lombardy. The other groups of mountains are the Oetzthal, Stubai, and Zillertal Alps, which connect the Rhetian Alps of Switzerland with the Hohe Tauern in the E. of the T., where they attain their culminating point, Gross-Glockner (12,455 ft.), on the frontiers of T., Salzburg, and Styria, and separate the valley of the Inn in the N. from the valleys of the Drave and Adige in the S. Besides the rivers already mentioned, the N.W. is watered by the Ill and Bregenz, flowing into Lake Constance, which forms the N.W. boundary. The climate is severe in the uplands, but in the narrow valleys of the S. there is a warm climate similar to that of Lombardy. T. is above all a pastoral land, the cattle as in other Alpine lands being the mainstay of the peasants; but forestry also employs a certain proportion of the population, and the saltworks of Hall, near Innsbruck, are famous. Silk-spinning is carried on in the S., and good wines

are produced near Meran and Bozen. There are also factories for preserved fruits and tobacco. Capital, Innsbruck. T. was in Roman times inhabited by the Rhetians. It passed into the possession of the House of Hapsburg in the 13th century. Pop. 946,613.

Tyrone: 1. A co. in the prov. of Ulster, Ireland, bounded N. and W. by Donegal, S. by Monaghan and Fermanagh, E. by Lough Neagh and Armagh. It is hilly in the N. and S., the principal ridges being the Sperrin Mts. (2240 ft.) in the N.E. and the Slievebeagh (1255 ft.) in the S. The principal rivers are the Foyle and the Mourne flowing into it, the tributaries of which are the Strule and the Derg and the Blackwater. There are a few lakes, of which Lough Neagh is the largest. In the E. is a fertile plain, and agriculture flourishes. Oats is the chief grain crop, and potatoes and turnips are grown; a considerable area is occupied by pasture, and cattle are reared in large numbers; poultry are also kept. Linens and coarse woollens (including blankets), soap, candles, and earthenware are manufactured. The county is divided into eight baronies and returns four members to parliament. There are several interesting ruins in the county. The area is 1260 sq. m. Pop. (1910) 142,437, decreasing owing to emigration. Omagh is the county town. 2. A hor. of Blair co., Pennsylvania, U.S.A., on the Little Juniata R. It is situated at an elevation of 910 ft., and is an agricultural district. Limestone is found, and coal is brought here from the Clearfield coal mines. A considerable trade in lumber is carried on, and the Pennsylvania Railway has repairing shops here. Pop. (1910) 7176.

Tyrone, Hugh O'Neill, Earl of (c. 1540-1616), an Irish rebel, frequently engaged in intrigues against Elizabeth. He eventually promised submission, but afterwards regarded with suspicion and forced to flee in 1607, dying at Rome. His nephew, *Owen Roe O'Neill* (c. 1590-1649), fought in Ireland in 1642, being chosen general by the Ulstermen, and was successful against the English and Scots.

Tyrrell, George (1861-1909), an Irish divine, born in Dublin. He entered the Society of Jesus and passed his novitiate with that order. Later he became teacher of philosophy at Stonyhurst. His writings demonstrate the powerful effect upon him of the work of Cardinal Newman. His best known writings are: *Nova et Vetera; The Faith of the Millions; Hard Sayings; Through Scylla and Charybdis* (wherein he

evolved his idea of revelation as experience); and *Mediævalism*.

Tyrrhenian Sea (ancient *Tyrrhenum Mare*), that part of the Mediterranean Sea between Italy and the islands of Corsica, Sardinia, and Sicily.

Tyrtæus, son of Arehembrotus of Aphidnæ in Attica. According to the older tradition, the Spartans during the second Messenian War were commanded by an oracle to take a leader from among the Athenians, whereupon they chose T. Later writers represent T. as a lame schoolmaster, of low family and reputation, whom the Athenians purposely sent to the Lacedæmonians as the most inefficient leader they could select, being unwilling to assist them in extending their dominion in the Peloponnesus, but little thinking that the poetry of T. would achieve that victory. See Murray, *Ancient Greek Literature*.

Tyrwhitt, Thomas (1730-86), an English classical commentator, born in London. He was master of both English and classical literature, and published editions and emendations of classical authors, including: *Aristotelis de Poetica Liber, Græce et Latine*, 1794; *De Lapidibus*, 1781; *Observations . . . upon . . . Shakespeare*, 1766; *The Canterbury Tales of Chaucer*, 1775; and *Poems supposed to have been written . . . by Thomas Rowley*, which was the chief work exposing the Rowley forgeries, 1777 and 1778.

Tytler, Patrick Fraser (1791-1849), an historian; studied in Edinburgh, and was called to the bar in 1813. Among his many writings are an *Essay on the History of the Moors in Spain*, *The Life of the Admirable Crichton* (1819), *History of Scotland* (1828-43), and *England under the Reigns of Edward VI. and Mary* (1839). His *History of Scotland*, which was the result of twenty years of study and research, is still authoritative.

Tytler, William (1711-92), a Scottish historian, born in Edin-

burgh. He published: *The Inquiry . . . into the Evidence against Mary Queen of Scots*, 1759, and *The Poetical Remains of James the First, King of Scotland*, 1783.

Tzana, see DEMBEA.

Tzar, see TSAR.

Tzarskoye, see TSARSKOYE SELO.

Tze-Hsi (1834-1908), Dowager Empress of China, born of humble parents, but being sold as a slave became the property of a famous general, who gave her as a present to the Emperor Hsien-Feng. He was so struck by her beauty that he made her his secondary wife, and she became the mother of Tung Chi. On the death of Hsien-Feng (1861) she became regent of the empire, administering the national affairs with more vigour than any of her predecessors until her son came of age, and after his death (1875) acted in the same capacity for her nephew, Kwang-Hsu. She was a woman of great power and ability, and when in 1898 the emperor endeavoured to shake himself free of her influence and to institute reforms he found himself a prisoner in the Summer Palace. But the unpleasant impression produced by these measures ultimately came to a head, and in 1900 the Boxer Rising took place, which was only suppressed by the intervention of foreign powers. After this the power of the empress declined, for China began to realise the necessity for reform, and after the Russo-Japanese War the Liberal party gained the ascendancy and began its work. Her death in 1908 removed a powerful obstacle from the new régime, and with her passed away the last prominent representative of the old era in China.

Tzetzes, Johannes (c. 1120-83), a Greek author, wrote commentaries on Homer, Hesiod, and Aristophanes, besides *Iliaca*, a poem concerned with the story of Troy, and *Chiliades*, a collection of mythical and legendary tales.

U

U, the twenty-first letter of the English alphabet, and the last of the five vowel sounds, intimately connected with *v* and *w*. With the former of these the symbol *u* was interchangeable until the spelling settled down at the end of the 17th century. The original sound of M.E. short *u* is preserved in such words as *put* and *pull*, while provincial pronunciation retains it more widely. For the pronunciation of *u* the breath passage is wider than for that of any vowel, and hence its tone is low vibrant.

Ubeda, a city of Spain, in the prov. of Jaen, on the Guadalquivir, in a fruit-growing and vine district. It has linen and esparto-grass industries. There is a cathedral and interesting old Moorish walls. Pop. 20,000.

Ucayali, a riv. of Peru, E. of the Andes, unites with the Marañon to form the principal stream of the Amazon, 900 m. from its source. It is navigable to Sarayaou. Length (estimated) 1500 m.

Uccello, or **Ucillo** (1396-1475), the name given to the painter and sculptor, Paolo di Dono, from his love of painting birds. He was born in Florence, and became one of the assistants of Lorenzo Ghiberti in constructing the bronze gates for the baptistery. His 'Battle of Sant' Egidio' (1416) is in the National Gallery, London; his 'Equestrian Portrait of Sir John Hawkwood' (1436) is in the Duomo, Florence, which also contains some of his frescoes.

Ucele, a tn. of S. Brabant, Belgium, 2 m. S. of Brussels. Pop. 26,000.

Uchi, or **Yuchi**, a N. American tribe which formerly occupied Georgia and S. Carolina. By the end of the 18th century they had moved westwards of Chattahoochee, and are now incorporated with the Creeks in Oklahoma.

Uckermünde, a tn. of Pomerania, Prussia, at the mouth of the Ucker, 32 m. N.W. of Stettin. Pop. 6252.

Uckfield, a market tn. and par., Sussex, England, on the R. Ouse, 8 m. N.E. of Lewes. Pop. (1911) 3344.

Udaipur, **Oodeypore**, **Obeypoor**, or **Meywar**, a feudatory state and capital in the Rajputana district, India. State, area 12,700 sq. m.; pop. 1,030,000. The capital, Udaipur, is situated on Lake Pichola. Pop. 46,000.

Udal, see **ALLODIUM**.

Udall, or **Uvedale**, John (c. 1560-92), a Puritan divine, who was prosecuted (1586) and deprived (1588) of his living at Kingston-on-Thames for his tracts against episcopacy. He then preached at Newcastle in Northumberland, until in 1590 he was condemned to death on a charge of complicity in the Marprelate tracts, but was pardoned in 1592. He wrote *The Key of the Holy Tongue*, a Hebrew dictionary (pub. 1593).

Udall, a seaport tn. of Göttingen, 45 m. N. of Gothenburg. It has shipbuilding, wool and textile industries, and exports timber and oats. Pop. 12,581.

Uddingston, a tn. of Lanarkshire, Scotland, near the R. Clyde, 7 m. S.E. of Glasgow by rail. It manufs. agricultural implements. Pop. (1911) 7500.

Udine, an Italian tn., 60 m. N.E. of Venice. It contains an old castle, once the residence of the patriarchs of Aquileia and now a prison; a cathedral, containing fine sculptures and paintings; law courts, a town hall, and various hospitals. It manufactures silk and leather goods. Pop. 25,000.

Udong, a tn. of Cambodia, French Indo-China, on a trib. of the Toule-sap, 25 m. N.W. of Phnom-penh. It was the cap. of Cambodia until 1866. About 5 m. to the N. are the remains of the triple walls which surrounded the town of Cambodia or Lovek. Pop. (estimated) 16,000.

Ueberlingen, a tn. of Baden, Germany, on an arm of Lake Constance, 8 m. N. of Constance. It manufs. linen, hosiery, and tobacco. Pop. 4550.

Ueberwog, Friedrich (1826-71), a German philosopher, born at Leichlingen, Prussia; educated at Göttingen and Berlin. In 1868 he became professor of philosophy at Königsberg. His best known works are: *System der Logik und Geschichte der logischen Lehren* (1857; 5th ed. 1882; English trans. by Lindsay, 1871); and *Grundriss der Geschichte der Philosophie* (1863-66; 8th ed. 1894-98; English trans. by Morris, 1871). See *Memoirs of him* by F. A. Lango, 1871, and M. Braseh, 1889.

Ufa, a tn. of European Russia, cap. of the gov. of Orenburg, at the confluence of the Ufa and the Belala, 200 m. N. of Orenburg. It is walled and defended by a citadel. The

Bishop of Orenburg, and a Mohammedan mufti have their seat here; and there are six churches, a number of mosques, and two convents. A considerable trade is carried on in corn and cattle. About half of the inhabitants are Tartars. Pop. 96,295.

Uganda, a British protectorate in Central E. Africa, bounded on the S. by Lake Victoria Nyanza and German E. Africa; on the W. by Lake Albert Edward, the R. Semliki, Lake Albert Nyanza, and the R. Nile; and on the E. by Lake Rudolf. In 1890 U. placed itself under the control of the Imperial East Africa Company, and in 1895 was converted into a separate protectorate of the British empire, with its headquarters at Entebbe, on the N.W. coast of the Victoria Nyanza, and 20 m. S. of the native capital, Mengo. In 1900 U. was divided into six provinces, and in 1902 the Eastern province was transferred to the British E. Africa Protectorate. The government now consists of a commissioner and consul-general, who represents the imperial government, and is nominally commander-in-chief of the army. He is supported by a deputy-commissioner and three sub-commissioners, who are placed over three of the five provinces, U. proper being regarded as the 'homo' province, since it holds the residence of the commissioner. These are assisted by collectors and assistant-collectors, who act as magistrates, and numerous other departments. The Hamitic races invaded U. about 5000 years ago, thereby modifying the ethnological features of the country. In 1857 Mutesa, king of U., entered into political relations with the British agent at Zanzibar. Sir H. M. Stanley visited the country in 1875, and on the invitation of the king introduced Anglican missionaries. Immediately there commenced a rivalry between Protestants, Roman Catholics, and Mohammedans. In 1884 Mutesa was succeeded by Mwanga, who commenced a series of terrible and bestial orgies, which resulted in Mohammedans and Christians uniting to depose him, whereupon he fled and placed himself under the shelter of a Roman Catholic community, at the same time espousing that faith. Then commenced a struggle between Mohammedans and Christians, resulting in the temporary supremacy of Islam. This was followed by various attempts of adventurers and missionaries to gain political influence for their various countries. Mwanga had been replaced on his throne and all differences settled by 1895, when U. was declared a protectorate. The pioneers in the advancement of U. were Grant and

Cunningham. Berkeley was the first commissioner, and gradually U. advanced in prosperity, after the rebellion of 1897 and the Sudanese mutiny were quelled and Mwanga deposed and deported to the Seychelles. Christianity has now the predominant influence, there being over 300,000 adherents. The climate varies, and the country is divided by the Rift Valley. The chief mountain is Mt. Elgon, while the country is watered by the R. Kagera and the lakes above mentioned. There is a large mineral reserve, including gold, copper, iron, and graphite. Blacksmithing, brick-laying, pottery, weaving, and cotton growing are now practised by the natives, under the tuition of the missionaries. See Speke, *Discovery of the Sources of the Nile*; Wilson and Felkin, *Through the Dark Continent*; Sir H. Johnstone, *The Uganda Protectorate*; Sir F. Treves, *Uganda*.

Uggione, Marco da, also written Oggione (c. 1480-1530), a Milanese painter; a pupil and imitator of Leonardo da Vinci. His chief works are the two copies of Da Vinci's 'Last Supper,' the original being lost. One copy is in London. He also executed an altarpiece at Milan, and 'The Three Archangels,' his best original work.

Uglich, a tn. of Yaroslav gov., Russia, on the r. b. of the Volga, 67 m. S.W. of Yaroslav. The town is very ancient and contains a 13th century cathedral, two monasteries, and the palace of Prince Demetrius, who was killed here in 1591. It has a large trade and numerous manufs. Pop. 9698.

Ugolino della Gherardesca (d. 1289), immortalised in Dante's *Inferno* as Count Ugolino, was a Neapolitan who endeavoured to usurp the government of Pisa. Succeeding after some time in this attempt, he governed the country with great vigour. The Archbishop of Pisa, Roger de' Ubaldini, formed a conspiracy against him in 1288; and attacking U. in his palace, defeated and took him prisoner. He was eventually starved to death.

Ugrian, the name applied to a Finno-Turki family originally found E. of the Urals. The chief branches are the Finns, the Ostiaks, the Voguls, and the Magyars.

Uhde, Fritz Karl von (b. 1848), a German painter, born at Wolkenburg, Saxony; studied at Dresden, Munich, and Paris, and served in the army. His work is based on naturalistic principles.

Uhland, Johann Ludwig (1787-1862), a German poet, born at Tübingen, where he graduated in law (1810), and later became professor of German literature (1829-33). After a sojourn

in Paris, during which he spent most of his time studying mediæval literature, he took up an appointment in the law courts at Stuttgart (1812-14). By this time he had already written a number of poems (since 1807), and an historical thesis, *Das Altfranzösische Epos* (1812). In 1815, having decided to take up literature as his profession, he published a collection of his poems, *Gedichte*, which went through about fifty editions during his lifetime. This was followed by two dramas, *Ernst, Herzog von Schwaben* (1818), and *Ludwig der Baier* (1819), which although fine in sentiment are not suited for stage production. His poems are mediæval in spirit, and are a typical product of Romanticism, although of perfect finish. Besides U.'s literary exertions, he figured with some prominence in political life, being a member of the Frankfort Parliament in 1848. See *Life* by H. Fischer, 1887, who also edited his works, 6 vols., 1892.

Uhlans were originally cavalry men employed in reconnoitring, outpost duty, etc. The name is particularly applied to the Prussian cavalry, who are armed with the lance.

Uig, a par. of Lewis Is., Outer Hebrides, Scotland, 34 m. W. of Stornoway. It contains remains of the shrine of St. Catan. Pop. (1911) 4462.

Uigurs, an historical Turkish race who inhabited Eastern Turkestan. They were the founders of the kingdom of Hiong-Nu, the southern empire of which was destroyed by the Tunguses in the 3rd century A.D. The southern U. then founded the kingdom of the Huns. The northern U. were at the zenith of their power and civilisation in the 5th century A.D. They became followers of Islam, but their religion shows Buddhist, Chinese, and Zoroastrian influences. They probably taught Syrian writing to the Mongols and Manchus. The race is now merged with surrounding peoples. See the works (German) of Klaproth, Vánbéry, Schott, and Radloff (*Aus Sibirien*).

Uintab, a lofty mountain range in Wasatch co., Utah, U.S.A., extending into Wyoming. The highest points are Gilbert Peak (13,680 ft.), Emmons Peak (13,694 ft.), Mt. Hodges (13,500 ft.), and Dawes Peak (13,300 ft.). The Green R. and the Uintah R. have cut deep gorges in the range.

Uist, two islands of the Outer Hebrides, Inverness-shire, Scotland: 1. N. Uist lies 8 m. S.W. of Harris, and is separated from Skye by the Little Minch. It is 18 m. long, and from 3 to 14 m. wide. It is very hilly in the W., the highest peak being Mt.

Eaval (1138 ft.), and on the E. has the two sea lochs of Eper and Maddy. Pop. (1911) 3677. 2. S. Uist is situated 36 m. S.W. of N. Uist, and has a maximum length and breadth of 22 and 8 m. The principal sea lochs, Boisdale, Skipport, and Eynort, are on the E. coast. The chief occupation of the islanders is fishing. Pop. (1911) 5383.

Uitenhage, a tn. in the dist. of Uitenhage, Cape of Good Hope, S. Africa, 21 m. by rail N.W. of Port Elizabeth; has railway works and wool cleaning. Pop. 12,200.

Ujiji, a tn. in E. Africa, on the eastern shore of Lake Tanganyika, belonging to Germany. It is the terminus of a caravan trading route from Zanzibar. Formerly there was a slave market.

Ujjain, or Oojein (Gk. *Ozene*), a city in Gwalior state, Central India, 32 m. N. of Indore. It was the capital of Malwa under Akbar, and is a sacred city. It exports opium. Pop. 40,000.

Ukase, a term applied in Russia to all legislative or administrative orders or edicts proceeding from the Czar or the Senate.

Ukraine, a part of Poland. The term was first applied to the Tartar frontiers of Poland, and later to the district about the middle Dnieper. In the 17th century the portion E. of the Dnieper passed to Russia, and forms Little Russia. At the second partition of Poland (1793) the western portion also passed to Russia.

Ulcer, a gradual destruction of tissue as a consequence of infection or injury. The difference between ulceration and gangrene is that, in the former, the disintegrated tissues are cast off in liquid form as a discharge, while in gangrene visible portions of tissue are detached. In most cases, an U. is a healing process by which diseased tissue is gradually dissolved in an 'ichor,' while the area of the sore diminishes, a scar or cicatrix taking the place of the ulcerated surface. In some cases the toxic element is too powerful for the normal healing process, and the U. tends to spread, the discharge itself being specially infectious. The best treatment is dressing with an antiseptic such as borio acid. Caustics and astringents such as silver nitrate are often useful. As ulceration is frequently accompanied by an enfeebled state of the system, the administration of a general tonic, such as Easton's syrup, is to be recommended.

Uleaborg (Finnish *Oulu*): 1. The northernmost lin or prov. of Finland, bordering on Norway, Sweden, and Russia. Area 63,957 sq. m. It consists of the plateau (1000-1200 ft.)

of Laponia, the fertile lowlands of Osterbotten on the Gulf of Bothnia, and the plateaux (1500-1640 ft.) of Saomanselka and Kajana. Pop. 268,226. 2. Chief tn. of above; a seaport at mouth of R. Ulea in Gulf of Bothnia, with trade in wood, tar, and pitch. Pop. 20,000.

Ulema, the collective name of a certain class of theological jurists in Turkey, who, as is the case in Mohammedan countries, derive their decisions from the Koran and its commentaries. The U. enjoys many privileges; he pays no taxes, cannot be condemned to death or deprived of his property by any court of law. He can only—eventually—be deposed and banished. The U. have to recognise, save their two immediate superiors (the *kadiasks* or *kadilesks*), only the mufti as their chief authority, whilst they are the superiors of all the Mullahs in the different provinces.

Ulex, an important genus of Leguminosæ, found in W. Europe and N. Africa. Three species occur in Britain, and are known popularly as the gorse, furze, or whin.

Ulphilas, Ulphilas, Wulfilas ('little wolf') (c. 311-385), the celebrated translator of the Bible into Gothic. Consecrated bishop in 348 he was expelled by his heathen compatriots from his native place, and sought refuge in Lower Mœsia, where he remained for thirty years. In 385 he went to Constantinople (whither he had gone once before in 360 to assist at a council), and died there shortly afterwards. He was one of the chief lights of Arianism, in the interest of which he exerted himself with the utmost energy. His greatest work, however, is his Gothic translation of the Bible, a work by which he contrived both to fix the Gothic language and to perpetuate Christianity among the Gothic people.

Uliasutai, or Ooliasutai, a tn. in N. Mongolia, China, 1100 m. N.W. of Peking, is a trading centre and a garrison town. Pop. (estimated) 4000.

Ullapool, a vil. of Ross and Cromarty, Scotland, on Loch Broom, 50 m. S.E. of Stornoway by water; has important fisheries. Pop. (1911) 2000.

Ullmann, Karl (1796-1865), a German Protestant theologian, born at Effenbach, Bavaria. He studied at Heidelberg and Tübingen; going to Halle to lecture in 1829. In 1836 he was invited to a chair at Heidelberg. U., with the assistance of Umbreit, started the *Theologische Studien und Kritiken* in 1828. He wrote strongly in favour of freedom in theological teaching.

Ulloa, Antonio de (1716-95), a

Spanish naval officer and scientist, born at Seville and entered the navy. In 1735 he went to S. America with a French scientific expedition. He became rear-admiral in 1760, governor at Louisiana in 1764, and lieutenant-general in 1770. In 1780 he was tried before a court-martial for failure in a secret expedition to Florida, and afterwards retired.

Ullswater, the second largest lake in England, between Westmorland and Cumberland, 5 m. S.W. of Penrith, 8 m. long by $\frac{1}{2}$ m. broad and 210 ft. deep. Aira Force (80 ft.) falls on the W. side, and it receives the Patterdale Beck. It contains several small islands and has very varied scenery.

Ulm, a first-class fortress and river-port of Württemberg, Germany, in the circle of the Danube and on its left bank at its confluence with the Blau, 46 m. S.E. of Stuttgart. It is connected by bridges with Neu-Ulm, in Bavaria. It is included in the fortress district of Mainz and serves as a permanent camp. It contains the largest Protestant church in Germany, and has manufactures of hats, tobacco, pipe-bowls, machinery, instruments, and textiles. Pop. 56,109.

Ulmus, see ELM.

Ulphilas, see ULFILAS.

Ulpian, or Domitius Ulpianus, a Roman jurist of the 2nd and 3rd centuries A.D., born at Tyre. He was assessor in the auditorium of Papinian under Septimus Severus; associate justice under him and Caracalla, and chief adviser and praetorian prefect to Alexander Severus. He wrote many works, extracts from which form a large part of Justinian's *Digest*.

Ulpianus of Antioch, a rhetorician, the contemporary of Constantine the Great, is the reputed author of *Prolegomena*, and a commentary on the Olynthiac and two of the Philip-
pic orations of Demosthenes. There are also attributed to him commentaries on the orations of Demosthenes, commonly called *Symbulenticæ*, and on the *Oration of the Crown* and the *Oration against Leptines*. These commentaries were printed in Dobson's *Collection of the Attic Orators*.

Ulrica Leonora the Elder (1656-93), Queen of Sweden, daughter of Frederick III. of Denmark, wife (1680) of Charles XI. of Sweden and mother of Charles XII. and Ulrica Leonora the Younger.

Ulrica Leonora the Younger (1688-1741), Queen of Sweden, daughter of Charles XI. and sister of Charles XII. She acted as regent during her brother's absence in 1714, married Prince Frederick of Hesse in 1715, and on her

brother's death was elected (1719) Queen of Sweden by the Riksdag. In 1720 she abdicated in favour of her husband.

Ulrich von Hutten, see HUTTEN, ULRICH VON.

Ulrich, Hermann (1806-84), a German philosopher, born at Pforten; educated for the law at Halle and Berlin. In 1834 he became professor of philosophy at Halle, and remained there till his death. His works include: *Geschichte der Hellenischen Dichtkunst*, 1835; *Ueber Shakspeare's Dramatische Kunst*, 1839; *Ueber Princip und Methode der Hegelschen Philosophie*, 1841; *Das Grundprincip der Philosophie*, 1845-46.

Ulster, the northernmost of the four great divisions of Ireland, bounded by the Atlantic Ocean, North Channel, Irish Sea, Leinster, and Connaught. It was one of the most ancient divisions of Ireland, and was the seat of the O'Neills. The N.E. part was for long a seat of English power in the N., but until the Plantation of U. in the reign of James I. no permanent settlement was made in the rest of U. Emigration has always been a drain on the population of the province, which decreased from 1,914,236 in 1891 to 1,582,826 in 1901. Nevertheless, the province is prosperous, flax-spinning being the most important industry next to agriculture. Iron and salt are worked in Antrim, and stone and various kinds of clay for bricks, etc., in other parts. U. has always, owing to the preponderance of Protestants, professed itself willing to resist Home Rule à outrance. The province is divided into Belfast and Londonderry county boroughs and the counties of Antrim, Armagh, Cavan, Donegal, Down, Fermanagh, Londonderry, Monaghan, and Tyrone. See separate articles on these. Total area 8613 sq. m. Pop. (1911) 1,581,696.

Ultimus Hæres ('last heir'), in Scots law, the person entitled to succeed to heritable property where there are no lawful heirs to take up the succession (see TERCE and JUS RElictæ).

Ultor ('the avenger'), a title of Mars, the Roman god of war. Augustus built a temple to U. in the Roman forum.

Ultramarine, the name given to a substance of a fine blue colour, originally obtained from lapis lazuli. It is obtained

by heating with kaolin, charcoal, and sulphur, at first with exclusion of air. The dull green product is converted into the blue compound by heating with sulphur with access of air. The U. is made ready for use by washing and levigating. It is stable to light and

air, but is decomposed even by weak acids. Aluminium, silicon, sodium, and sulphur are its chief constituents, but its exact constitution is not clear. It is used as a pigment for colouring papers and in laundry work.

Ultramontane ('beyond the mountains, i.e. the Alps), a term applied to Italy by countries N. of the Alps and transferred to the Italian party in the Roman Catholic Church, who attach great weight to papal supremacy.

Ultra Vires (Lat. 'beyond one's strength or power'), a legal phrase used particularly with regard to the limitation of the legal or constitutional powers of a person, court, company, or corporation. In company law anything done by a company outside the powers given in the Memorandum of Association (see COMPANY) is U. V. and void; nor can the company make it valid, even if every member assents to it, because the rule is framed for the protection of future shareholders and the public at large, who may have dealings with the company. Acts, however, beyond the powers of the directors only may be ratified by the shareholders; and acts U. V. the Articles of Association can be indirectly cured by simply altering the articles in the proper manner.

Ulugh-beg (1394-1449), a Tartar prince and astronomer, grandson of Timur-beg, and son of Shah Rukh, succeeded to the imperial throne of Samarkand on the death of his father in 1417. His son rebelled against him on account of the unjust suspicion with which he had been treated, and U. was put to death. U. is remembered chiefly as the founder of the observatory at Samarkand.

Ulundi, a vil. in Zululand, Natal, the scene of several battles between the Zulus and the British. U. was the royal kraal of the Zulu kings.

Ulverston, a market tn. of Lancashire, England, in the Furness dist., 9½ m. N.E. of Barrow-in-Furness; is connected by a ship-canal with the estuary of the Leven, and has a large export trade. Pop. (1911) 9552.

Ulysses, Ulyxes, or Ulixes, the name under which the Greek hero, Odysseus, was known among the Romans. U., who is the hero of Homer's *Odyssey*, was the son of Laertes and Anticleia (or, according to later tradition, of Sisyphus and Anticleia), King of Ithaca, husband of Penelope, and father of Telemachus. The story of U., as related by Homer, has been much extended and modified by later poets and mythographers. By Homer he is represented as the model of a prudent warrior, as a man of acuteness, and

always ready to devise means of avoiding or escaping from difficulties, as superior to all men in intelligence, in wisdom equal to the gods themselves, and in adversity courageous. Later poets sometimes represent him in a different light, as cunning, false, and mean. When the Greek chiefs had resolved upon their expedition against Troy, Agamemnon prevailed upon U. to join them, but it was with great difficulty he was induced to assist in the enterprise. During the war against Troy he acted a prominent part, sometimes as a gallant warrior and sometimes as a bold and cunning spy. Some say he devised the stratagem of the wooden horse. After the destruction of the city his wanderings and sufferings began, which form the interesting story of the *Odyssey*.

Ulzen, or Uelzen, a tn. of Hanover, Prussia, 20 m. S.S.E. of Luneberg. It has flax, sugar, tobacco, and machinery manufs. Pop. 10,422.

Uma, or Pārvatī, in Hindu mythology, the consort of Siva. She is also known as Kāti (the black one), Durgā (the inaccessible), and Māhadevī, and her worship is widespread.

Uman, a tn. in the gov. of Kier, S.W. Russia, 120 m. S. of Kiev city; has a horticultural college, and a trade in corn, spirits, beer, tobacco, leather, and iron goods. It was long held as a fort by the Cossacks of Ukraine. Pop. 30,000.

Umarkot, Omereote, or Amereote, a tn. of Sind, India, on the banks of the Narra. It exports the produce of the desert, and the inhabitants are chiefly Rajputs.

Umballa, or Ambala, a city, cap. of Umballa dist., Punjab, India, 39 m. S. of Kalka; is an important railway junction and military cantonment. Pop. 80,000. The district has an area of 1851 sq. m. and a pop. of 820,000.

Umbel, the term applied to the form of inflorescence common to plants of the order Umbelliferae. In the simple U. the pedicels spring from the same point of the peduncle and the flowers are on one level, e.g. cowslip; and in the compound U. the axis branches in an umbellate fashion and each branch bears a simple U., e.g. hemlock.

Umbelliferae, an important and widespread family of Dicotyledons, contains about 1600 species. The flowers are characterised by their five free sepals and petals (often minute), five free stamens, and the inferior bilocular ovary formed from two carpels. Some of the chief genera are *Carum*, *Eryngium*, *Apium*, *Daucus*, and *Cicuta*.

Umbel, a natural pigment, con-

taining hydrated oxides of iron and manganese. The earthy pigment was washed and dried at 212° F. It then constitutes 'raw umber' which, calcined, becomes a rich brown colour—'burnt umber.'

Umbilical Cord, see Fœtus.

Umbrella (Lat. *umbra*, shade), a portable protection from the sun or rain, is of great antiquity. Its use was known in China as early as the 11th century B.C., and ancient sculptures of it have been discovered in Nineveh, Persepolis, and Thebes (Egypt). In the East the U. was an emblem of rank. In ancient Greece and Rome U. were regarded as effeminate and seldom used by men, but in the 12th century the Doge of Venice had an U. with the ceremonial significance of a canopy. In English literature reference is made to the U. by Drayton (1620), Swift (*City Showers*, 1710), and Gay (*Trivia*, 1716). In the reign of Anne it was only used by women, the first man to carry it being Jonas Hanway (1712-86), a Persian explorer. The manufacture of U. is chiefly carried on in London, Glasgow, Manchester, Paris, and Lyons. They are made of a framework of steel ribs, covered with silk, cotton, alpaca, or gingham, and supported by a wooden or metal stick.

Umbrella Bird, or *Cephalopterus ornatus*, a species of Cotingidae, which is peculiar on account of a large umbrella-shaped crest on its head. The bird itself is of a uniform black plumage.

Umbrella Tree, the name given for an obvious reason to many plants, notably to *Magnolia Fraseri*, *Paritium Guineense*, and a species of *Acacia*.

Umbrette and Hammer-head are names applied to *Scopus umbretta*, a species of the family Ardeidae, to which the herons belong. The bird dwells in the woods of Madagascar near pools and rivers, and feeds on small animals.

Umbria, an ancient div. of Italy, lying between Etruria on the W., the Sabine territory on the S., Picenum on the E., and the Ager Gallicus on the N. The original territory of the Umbrians was continually plundered in the 6th century B.C. by Gallic and Etruscan invaders, until they were restricted to the upland tracts of the Apennines. They joined the Samnites against Rome, but were subdued at Narnia (295). See Bücheler's *Umbria*, 1883, and Hutton's *Cities of Umbria*, 1905.

Umeå, a seaport of Westerbotten, Sweden, near the mouth of the Umeå R., in the Gulf of Bothnia, 95 m. N.E. of Hernösand. Pop. 5859.

Umpire, see **ARBITRATION** and **CRICKET**.

Umrir, a tn. of Nagpur dist., Central Provinces, India, 25 m. S.E. of Nagpur. It manufs. cotton-cloth. Pop. 16,000.

Umrtsar, see **AMRITSAR**.

Umtali, a tn. on the E. border of Southern Rhodesia. It has railway works and is a centre of the gold trade. Pop. 840 whites.

Unalaska, see **ALEUTIAN ISLAND**.

Unao, a tn. and dist. in the Lucknow div. of the Central Provinces, India. The town is 10 m. N.E. of Cawnpore, and has a population of 13,500. The district has an area of 1737 sq. m. and a pop. of 1,000,000.

Unclaimed Dividends. By the Joint Stock Companies Winding-up Rules, where the liquidator has moneys representing dividends which have been unclaimed or undistributed for six months after the date of receipt, he must pay them into the Bank of England to the Companies Liquidation Account; after which any person claiming to be entitled must obtain a certificate of his title from the liquidator, and apply to the Board of Trade for payment. By section 52 of the National Debt Act, 1870, unclaimed government stock, including therein dividends, is transferred to the National Debt Commissioners, and in the books of the Bank of England and the Bank of Ireland are entered the names and residences of the persons who held such stock prior to the transfer. This list is open to inspection by any person who can show ground for claiming. If he establishes his claim he may have the stock retransferred to him, together with the amount of unpaid dividends in cash, without interest; but he has no title to any accumulations arising from the investment of such stock.

Unconformity. Where an overlying series of rocks rests upon the eroded edges of an older series, usually having a different dip, the beds are said to be unconformable, and the appearance is termed U.

Unconsciousness, the condition in which no perceptions are made. As it is difficult to define consciousness, so is it difficult to define its opposite, but in common speech the state of U. implies a suspension of the ordinary mental phenomena of consciousness; the mind is a blank for the time being, as in sleep, coma, fainting, etc. The immediate cause of U. is a disturbance of the cerebral circulation, either by congestion, as in coma, diminution of blood, as in syncope, or poisoning, as during anæsthesia, etc. Normal individuals become habitually unconscious periodically by the phenomenon of sleep. It is

well established that the brain is more or less drained of blood during sleep, but the exact manner in which the mechanism works is not yet known. It is certain, however, that cessation of activity is essential for the well-being of the higher nervous centres, and although the limbs and other parts are normally quiescent during sleep, the state of U. is necessary primarily for the recuperation of the specific nervous agencies. It is doubtful if we can speak of any state of U. as complete; even the blankness of mental states appears to be a mental state, while there are gradations running from a sound sleep through dreamy conditions to the most alert state of general attention that we are capable of. Even intensity of attention is accompanied by a withdrawal of attention from subjects away from the focus of consciousness, so that a person may be said, even when most determinedly awake, to be 'unconscious' of many things. See **HYPNOTISM**.

Unction, see **EXTREME UNCTION**.

Undercliff. The, a succession of cliffs and terraces sloping towards the sea on the S. coast of the Isle of Wight, and extending from Dunnesse past Ventnor to Blackgang Chine, which seem to have been formed by landslips. The district extends for about 7 m., and is from $\frac{1}{2}$ m. to $\frac{1}{2}$ m. in width.

Underground Dwellings are distinguished from cave, mound, or rock dwellings in being excavated and strengthened inside. They are prehistoric and belong originally to the stone age, though probably continued in use to much later times. In folk-lore they are associated with fairies, dwarfs, etc., the evidence pointing to habitation by conquered aborigines of small stature. Their distribution from China, Korea, and Japan, along the northern stretch of the Old World to Scandinavia; their presence in Iceland, Greenland, N. America, and the Aleutian Isles, in all of which places they are yet found in use; and their occurrence in a belt

of rigor north-
They occur in many forms, gradually passing into that of mound dwellings (*q.v.*). In Scotland they are numerous in the upper valley of the R. Don, being known as *crd-houses*, *Picts' houses*, or *weems*, and evidently forming villages. They are supported by masonry of the simple, massive, Cyclopean kind, with no mortar, carvings, inscriptions, or marks of tools. The cave of Raitts in Inverness-shire has the form of a horse-

shoe with one limb truncated, and is about 70 ft. long, 8 ft. broad, and 7 ft. high. The side walls converge upwards and are covered with large slabs. At Pitcur, in Forfarshire, the length of an U. D. is nearly 70 yds., entered by means of ladders or notched poles, but could hardly have been intended for defence. They may have been used in remote and undesired places as normal residences, or probably more often as places of concealment to which the inhabitants might retire when threatened by attack.

Underground Railroad, a secret system formed in the Northern States of America before the Civil War in order to assist fugitive slaves to reach Canada, where they were safe from recapture. Guidance, shelter, food, and clothing were provided by the sympathisers.

Underground Railway, see LONDON—Traffic.

Under-sheriff, see SHERIFF.

Understanding, in philosophy, a term used in two somewhat different senses. By the older English philosophical writers, such as Locke and Hume, it is used to denote the human mind in general, and the human intellect in particular, in opposition to the faculties of emotion and volition. It is now more used in the sense given it by Kant and developed by Hegel. In this sense U. is the lower faculty of the mind which deals with phenomena, while reason is the higher faculty dealing with noumena or universals.

Underwood. In law, saleable U., as opposed to timber trees intended for permanent growth, may be defined as 'woods consisting of oak, ash, or elm, which are universally timber trees, or of beech, which may be timber by custom, or willow, the stools of which can be and are so treated as to produce a succession of saleable crops.' In less judicial language U. is small trees or shrubs growing amongst larger trees. A tenant for life or for a term of years is entitled to cut and make use of U., if ripe for cutting, but may be restrained from improper cutting or from cutting from saplings.

Underwriter, see INSURANCE.

Undeveloped Land Duty, see LAND TAXES.

Undines, the name given in the fanciful system of the Paracelsists to the elementary spirits of the water. They are of the female sex. Among all the different orders of elemental spirits they intermarry most readily with human beings, and the U. who gives birth to a child under such a union receives with her babe a human soul. But the man who takes an U.

to wife must be careful not to go on the water with her, or at least not to anger her while there, for in that case she will return to her original element. Baron de la Motte Fouqué has made this Paracelsist fancy the basis of an exquisite tale, entitled *Undine*.

Undue Influence. In law, a contract to which a party has been induced to give his consent by the exercise of U. I. on the part of another is voidable. So also a will can be attacked by interested parties on the same ground. Presumptions of U. I. arise generally in connection with gifts. It is entirely a question of fact whether in any particular case U. I. was used. The law will not presume U. I. until it is first proved that the relationship between the parties was or is such that one of them was likely to be able to exercise his influence over the other, and then it is open to the defendant to rebut the inference from such relationship. The relations of solicitor and client, parent and child, guardian and ward, trustee and beneficiary are all presumed to give the former, in each case, influence over the latter. But the strength of the presumption depends entirely on the intimacy of the relationship, e.g. that of a doctor and his patient is in most cases not nearly so close as that of a guardian and ward. U. I. is not in any way a doctrine specially connected with defective will power, though such fact, if present, may be a strong element for the consideration of a judge or jury.

Undulatory Theory, see INTERFERENCE, LIGHT, OPTICS, etc.

Uneared Increment, see INCREMENT, UNEARNED.

Unemployment. It is only within recent years that anything like a scientific attempt has been made by the state to grapple with the problem of U. So far as skilled labour is concerned, the removal in the course of the last century of most legislative restrictions on trades unions left those institutions free to go beyond their primary purpose of providing benefits to distressed members and to organise specialised classes of labour in such a way as to mitigate the evils of U. in such classes. From the reign of Queen Elizabeth, when the vagrant or vagabond class had increased so as to require legislative attention, the only remedy the state had to offer was the Poor Law system, and in extending out-door relief the policy of the Poor Law ignored all distinctions between the destitute through trade depression and the congenital loafer or 'unemployable.' The recognition of the differences between the class of unemployed who are of good

character and can show good industrial records, the aged, infirm, or inefficient unemployed, and the morally defective unemployed, has at least resulted in an endeavour to meet these different classes with different remedies. Most modern remedies are, for the most part, and indeed necessarily, counteractive rather than constructive. Positive remedies, as, for instance, the provision of work on afforestation or land reclamation schemes, have often been suggested but never seriously put into practice; such schemes do not supply the need of permanent skilled work for the skilled unemployed, and it would not be difficult to show that

and that it is 'not easy to see how this periodic failure on the part of the community to make the most of its productive power can be repaired.' There is no doubt that much U. is due to the varying needs of the seasonal trades, especially the building trade, and the same writer suggests that the effects of periodic failure may be counteracted by public authorities taking care that their demand for labour shall vary inversely rather than directly as the trade cycle, but it is difficult to see how such a policy can be any more economically sound than a scheme of afforestation or any other scheme for the artificial creation of a demand for

FLUCTUATIONS IN EMPLOYMENT—PERCENTAGE UNEMPLOYED IN TRADES UNIONS (1901-12)

(From the Sixteenth Abstract of Labour Statistics of the United Kingdom)

Year	General Percentage for all Unions included in Returns	MEAN ANNUAL PERCENTAGE returned as Unemployed in				
		Engineering, Ship-building, and Metal	Building	Wood-working & Furnishing	Printing and Book-binding	All other trades included in the Returns
1901	3.3	3.8	3.9	3.7	4.5	2.1
1902	4.0	5.5	4.0	4.1	4.6	1.9
1903	4.7	6.6	4.4	4.7	4.4	2.5
1904	6.0	8.4	7.3	6.8	4.7	3.0
1905	5.0	6.6	8.0	5.8	5.1	2.3
1906	3.6	4.1	6.9	4.8	4.5	1.9
1907	3.7	4.9	7.3	4.6	4.3	1.6
1908	7.8	12.5	11.6	8.3	5.5	2.9
1909	7.7	13.0	11.7	7.6	5.6	2.6
1910	4.7	6.8	8.3	5.4	4.9	2.2
1911	3.0	3.4	4.2	3.3	5.1	2.1
1912	3.2	3.6	3.7	3.1	5.2	2.1

a policy of creating work by the state can have little better economic results than the direct pecuniary dole. From statistics supplied by metropolitan distress committees under the Unemployed Workmen Act, 1905, it appears that only about 15 per cent. of the unemployed are skilled workers, and though in drawing inferences from such an estimate it is of vital importance to take into account those whom chronic U. has rendered virtually unfit or unskilled, it is reasonable to assume that the state is justified in focussing its attention mainly on the problem of the casual unemployed class and in formulating schemes for decasualising such labour. Professor Chapman (in Palgrave's *Dictionary of Political* points out the undeniable fluctuations in employment. Trade unionists are 'closely correlated with the cyclical trade movements,'

labour. The principal modern means of diminishing U., whether abroad or in England, are: (1) Labour Exchanges, which grew out of the system of local exchanges. The great changes, American state unemployment offices, French public labour bureaux, or by whatever name these institutions may be called, is that they mobilise labour or apprise the man in search of work of a vacancy suited to his abilities far more quickly and efficiently than he can do so himself (see LABOUR EXCHANGES). (2) Labour Colonies. These institutions are fully dealt with under LABOUR COLONIES; it is only necessary here that they are mostly of penal or reformatory character and exist rather to decasualise unskilled labour by the supply of more or less unremunerative

work than to give work to the fit (see also BORSTAL; PREVENTION OF CRIME). (3) Insurance. Compulsory and voluntary state insurance against U. is the latest remedy in English industrial history. But a compulsory insurance scheme had existed in France, but Professor Chapman

NUMBER OF UNEMPLOYMENT BOOKS ISSUED UNDER THE NATIONAL INSURANCE ACT UP TO JULY 12, 1913.

(From the Sixteenth Abstract of Labour Statistics of the United Kingdom)

Occupation	Building and Construction of Works	Ship-building	Engineering and Iron founding	Construction of Vehicles	Saw-milling	Other insured work-people	Total
Bricklayers	79,319	129	1,832	26	—	3,622	84,928
Masons	48,809	—	30	—	—	2,386	51,225
Carpenters	150,629	13,871	10,118	4,940	1,241	10,762	191,561
Plumbers	44,414	3,047	2,808	564	—	2,117	52,950
Plasterers	24,523	—	—	—	—	147	24,670
Painters	153,939	5,880	6,200	17,629	59	2,087	185,794
Sawyers, etc.	6,393	1,390	2,723	2,996	8,904	—	22,406
Navvies and Contractors	—	—	—	—	—	—	—
Labourers	150,638	—	124	—	—	—	150,762
Platers, Riveters, and Boiler-makers	3,430	53,801	41,601	2,640	—	1,454	102,926
Shipwrights	26	31,189	—	—	—	—	31,215
Pattern-makers	314	971	14,343	442	—	224	16,294
Moulders (Metal)	72	1,003	87,787	1,559	—	1,306	91,727
Smiths	3,906	5,000	27,928	10,492	70	7,903	55,299
Erectors, Turners, Fitters	7,425	12,497	240,721	33,261	330	25,338	319,572
Metal Machinists	771	2,634	71,079	16,899	—	1,306	92,689
Wiremen, Electricians	5,672	1,988	19,219	1,023	—	2,690	30,592
Cycle Makers	—	—	—	14,775	—	—	14,775
Motor Chassis Makers	—	—	—	6,923	—	—	6,923
Coach-makers	—	—	—	44,299	—	605	44,904
Cabinet-makers	4,724	2,380	602	5,638	93	—	13,437
Other skilled Workers	15,697	3,847	32,279	4,639	129	903	57,494
Labourers, etc.	346,967	134,601	306,169	47,283	8,292	23,484	866,796
	1,047,668	274,228	865,563	216,028	19,118	86,334	2,508,939

for some years in Germany prior to the passing of the National Insurance Act of 1911 in England. A voluntary system was tried in Cologne and Leipzig over ten years ago, but it was soon found that the amount expended on benefits far exceeded the revenue from contributions. Profiting by this lesson some of the Swiss points out two vital defects in this system: (1) The state subsidies would probably be used to support strikes; (2) it makes an invidious distinction between unionist labour and non-unionist labour, with the result that the latter would be almost bound to start independent schemes. As to the provisions of the National In-

insurance Act, 1911, relative to U. insurance, *see under* NATIONAL INSURANCE ACT.

Ungava, a former dist. of Labrador, Canada, occupying all the interior of the peninsula. Area 355,000 sq. m. It contains numerous lakes and is watered by many small rivers. It is now absorbed in Ontario, but the district is still unorganised. Fort Chimo is the chief port. Pop. 5113.

Unger, Franz (1800-70), an Austrian botanist and geologist, born in Styria. He was appointed professor of botany at Gratz (1836) and at Vienna (1850). He *tomie und Physiolog.* 1855, and *Geologie* i Waldbaume, 1869.

Unger, Joseph (b. 1828), an Austrian jurist and statesman, born and educated in Vienna, and became professor of jurisprudence in the university there in 1857. He entered politics in 1867 and held several important posts. His chief work is *System des Oesterreichischen Allgemeinen Privatrechts*, 1856-59.

Unguent, *see* OINTMENT.

Ungulata, a large order of hoofed mammals, including the Ruminantia and Pachydermata of Cuvier. The feet are never plantigrade and the toes are never clawed, and number more than four only in the elephants (Proboscidea).

Ungvar, a tn., cap. of co. Ungvar, N.E. Hungary, on the Ung, 80 m. N.N.E. of Debreczin. It is a see of the Greek Church. There is a mineral spring and a trade in wine and timber. Pop. 15,000.

Uniate, those communities of E. Christians which acknowledge the supremacy of the Pope and are not required by him to accept certain of the W. disciplinary regulations. In general, they use their own liturgy in their own tongue, use leavened bread, and have a married clergy. They are governed by special papal decrees.

Unicorn (Lat. *unus*, one; *cornus*, horn), a fabulous animal referred to by Greek and Latin writers. It was said to be a native of India, resembling a horse in shape and size, and having one straight horn 1½ cubits long on its forehead. It was very swift. The figure is used in heraldry.

Unieh, Unije, or Unico, a maritime tn. of Trebizond, Asia Minor, on Black Sea, 50 m. S.E. of Samsun. Pop. about 10,000.

Uniform: MILITARY. — Originally, since regiments were usually raised almost as mercenary bands through the colonel of the regiment, the garb of the units of that regiment was decided by its commanding officer. No

regularity was observed, and the choice of garb depended entirely upon the taste of the officer commanding. The regiments raised for the service of the king wore naturally the livery of the king; this was scarlet, and so in the course of time all regiments came to wear a scarlet livery and to determine their origin only by a differentiation of the facings which they wore, such facings being generally the colour of the livery of the officer who raised them. The royal regiments, such as the household troops, wore the blue facings of the royal house. Gradually it came to be customary — giments of the same arm to more closely to one another after of U. Hence we find

during the Stuart and Georgian periods great changes being made in such direction, so that it became possible to call the costume of each regiment a U. The original Stuart cavalier hat passed first of all into the three-cornered hat that distinguished Marlborough's troops, and next into the cocked hat of the middle Georgian period. During the whole of this period the soldiers wore the knee breeches which for so long were the usual dress of the civilian. The short coat which for so long was universal in all branches of the service was replaced by the tunic in all regiments save the Highland and the Royal Artillery. The unserviceability of the army clothes was shown drastically during the Crimean War, and the Mutiny again proved that these should be replaced by something lighter and more serviceable for soldiers on foreign service. During the S. African War the troops were clad in khaki, and this has been now adopted as the service dress of all, or practically all, troops. Some of our troops have borrowed the models of their dress from abroad. The hussars have the Hungarian dress, and wear a bushy which has now developed into a hugo fur-covered hat with a strip of cloth stitched to the side. The lancers wear the U. of the Polish Uhlans, on the model of which they are founded. The cuirass was adopted by the dragoons and the household cavalry. The infantry head-dress has undergone many changes: the cocked hat gave place to the shako, and this, in the course of time, to the cloth, spiked helmet which is worn to-day. Towards the end of last century all royal regiments wore blue facings, all non-royal regiments white facings if English or Welsh, yellow if Scottish, and green if Irish. Now, however, this has been altered, and the regiments wear the facings which they held previous to 1881.

Military Badges. — These denote

rank in the ease of officers, and are then worn either on the shoulder, collar, or sleeve, and in the case of non-commissioned men proficiency in some special branch, and are then worn on the sleeve. Officers' badges are: one star, second-lieutenant; two stars, lieutenant; three stars, captain; crown, major; lieutenant-colonel, crown and one star; colonel, crown and two stars; brigadier-general, sword and baton; major-general, sword and baton and one star; lieutenant-general, sword and baton, crown and two stars; general, sword and baton, crown and three stars; field-marshal, crossed batons in a wreath of laurel and crown. Proficiency badges are denoted by: crossed colours, colour-sergeant; crossed axes, pioneer; spur, farrier; signaller, crossed flags; marksman, crossed rifles; wheelwright, a wheel.

NAVAL.—No uniformity of dress can be said to have appeared in the navy until about the year 1660. The Tudor livery of green was worn during the Tudor period and replaced by a scarlet livery under the Stuarts. The first attempt to obtain any uniformity was due to the official designation of the clothes which were stocked in the slop chest. In the 17th and 18th centuries the seamen wore usually kilt, trousers, a pea-jacket, and small cocked hat. These cocked hats were replaced by soft hats towards the end of the 18th century, and about the same time an attempt was made to introduce a U. for officers. The sailor collar which is worn at the present time dates its origin from the time when sailors wore 'pig-tails,' and were worn to prevent the hair soiling the uniform. During the revolutionary wars sailors wore a blue jacket and white trousers. By the middle of the 19th century both officers' and men's uniforms were fixed very much as they are at the present time. The present monkey jacket replaced the blue tunic about 1889. A white uniform is worn in the tropics.

Naval Badges.—The term badge is applied in the navy only to the distinctive signs worn by the men and boys. The distinctive marks of the varying grades of officers are not technically called badges, although the term is often commonly applied. Naval badges are worn as signs of good conduct, special qualifications, and rank. A first-class petty officer wears crossed anchors surmounted by a crown; a second-class petty officer, an anchor surmounted by a crown; a chief seaman, an anchor. On the left arm good-conduct badges are worn. Badges denoting special qualifications are worn on the right arm; chief among them are: a signaller, a

crossed flags; a marksman, usually crossed rifles; a stoker, a propeller; armourer, a gun and crossed axe and hammer; blacksmiths and wheelwrights, crossed axe and hammer; a torpedo-man, a crossed gun and torpedo. Chief petty officers are known by the distinctive buttons which they wear, as also are engineer artificers.

Uniformation, see CATACHYSMAL ACTION.

Uniformity, Acts of, a series of Acts passed by parliament for the regularising of public worship in England. The Act of 1559 imposed the Prayer Book on the whole kingdom, and required all persons to attend their parish church. The best-known Act, however, is that of 1662. This required the new Prayer Book to be used in all churches and places of worship throughout the kingdom. For their refusal to conform to this regulation, a large number of ministers who had been inducted into benefices during the commonwealth period were compelled to give up their posts. The 1872 Act authorised certain shortened forms of services and made provision for special services.

Union: 1. The cap. of Union co., S. Carolina, U.S.A., 70 m. N.W. of Columbia, with cotton mills. Pop. (1910) 5623. 2. A tn. of Hudson co., New Jersey, U.S.A., on Hudson R., opposite New York. Pop. (1910) 21,023.

Union, or Tokelau, a group of islets in the Pacific, situated between lat. 8° 30' and 11° S., and long. 171° and 172° W., 350 m. N.E. of Samoa. The principal are Fakaofu, Nukunono, Nassau, Atafu, and they belong to Britain, being included in the Gilbert and Ellice Isles. Copra is the chief product. Area 7 sq. m. Pop. 1000.

Union, or Workhouse, see POOR LAWS.

Union-Castle Steamship Line was formed by the amalgamation of the Union (founded 1853) and the Castle (founded 1872) Lines in 1900. The Union Line from 1857 carried on a mail and passenger service from Southampton to the Cape and Natal, and at the time of its amalgamation had a fleet of twenty-three vessels. The Castle Line from 1872 shared the government's mail contract with the Union Line, starting from London instead of Southampton; in 1900 it had a fleet of twenty vessels. There is now a fleet of forty-four vessels, with a gross tonnage of 319,360. The *Edinburgh Castle*, built 1910, has a tonnage of 13,326.

Unionidæ, a family of eulamellibranchiate molluscs, is represented by various living species in the fresh water of Africa, America, and other parts of the world. The genus *Mar-*

garitana contains the river pearl-mussels.

Union (Irish). The U. of Great Britain and Ireland was effected on Jan. 1, 1801, after being rejected by the Irish Commons the previous year by only one vote. The 'bigoted fury of Irish Protestants,' the attitude of the Irish Parliament during the disputes over the regency, and the fact that it was only by 'hard bribery' that the English government could secure their co-operation in the simplest measures of administration, all conspired to convince Pitt at the end of the 18th century of the absolute political necessity for U. There can be no doubt that the Act of Union was passed contrary to the wishes of the whole Catholic population of Ireland; but this was prior to the days of electoral reform, and the representatives of the Irish people, such as they were at that time in the Irish Parliament, were eventually induced by a liberal and shameless distribution of pensions and peerages to withdraw their opposition to the Bill. The Act provided that one hundred Irish members should become part of the House of Commons at Westminster, and twenty-eight temporal with four spiritual peers, co-opted for each Parliament by their fellow peers, should represent Ireland in the House of Lords. Commerce between the two countries was to be free from all restrictions, and the trading privileges of each were to be freely extended to the other, while there was to be a proportional distribution of the burden of taxation between the two nations. The English Parliament, however, reckoned without its host in the shape of agrarian discontent and poverty, not to mention the rankling sense of injustice that has lurked in the bosom of Irish Catholics ever since the earliest days of the English settlements; and the 'Irish question' has never ceased to be the great thorn in the side of every British government of modern times. Some measure of tranquillity was restored to Ireland in 1870 when an Act was passed to improve the position of the Irish tenants, and again in 1881 when the Gladstone government of that year gave tenants the right to sell or transfer their right of tenure, to demand that rents should be fixed, and that leases should be renewed for a definite period. None of these or later land reforms, however, have satisfied the Irish people, and peace of an ambiguous nature has only been preserved by such coercive measures as the Irish Crimes Act of 1892, passed by the Conservative Government under Lord Salisbury. The 'irreducible minimum' of Irish demands at the present

day is still the creation of an Irish Parliament to sit in Dublin, with

with the principle that the Irish executive should be responsible solely to the Irish Parliament. (The subject of Home Rule and the main arguments for and against 'separation' will be found dealt with in the article so entitled.)

Unionist, see **POLITICAL PARTIES**.

Union Jack, see **FLAG**.

Union Steamship Company of New Zealand was originally formed to carry on communication between the different ports of New Zealand and with Australasia. In 1875 the present company was formed, and extended its services to the Pacific, Canada, and India. There is a fleet of sixty-three steamers with a total tonnage of 158,000. The largest vessel is the *Uakura* (8075 tons).

Uniontown, a bor. of Pennsylvania, U.S.A., and the cap. of Fayette co., 44 m. S.S.E. of Pittsburg. Among the industries are glass-blowing and iron founding. Pop. (1910) 13,344.

Union University, Schenectady, New York, was founded in 1795 as a non-sectarian centre of higher education by representatives of various denominations. It owes its growth and development very largely to the energetic and enlightened policy of Dr. E. Nott, who was its president for over fifty years. In 1913 it had 769 students on its books with 123 instructors.

Unit, see **UNITS**.

Unitarianism. The term, in its strict and literal sense, denotes simply belief in one God, and when thus understood is a generic term applicable not only to Christianity but also to Judaism, Mohammedanism, and even to Deism. But it has now almost entirely lost this general sense, and is almost invariably used as the designation of the belief held by certain Protestants who, while rejecting the whole scheme of orthodox theology, have yet some kind of belief in the pre-eminent position of Jesus Christ in the world's history. This definition is somewhat vague, but the necessity for vagueness will be seen when we remember that certain Unitarians have shown such a zeal against dogmatism and definition as to object to the term Unitarian itself. No confession of faith has ever been issued by a Unitarian body, and it is difficult not to fall into a list of negations when describing Unitarianism. Unitarians deny the divinity of Jesus Christ, the doctrines of original sin, the atonement, and eternal punish-

ment held by the Evangelical churches. Unitarians lay great stress on the Fatherhood of God and on the universal brotherhood of men. They have always treated the Bible in a rationalistic manner, and most modern Unitarians would regard its inspiration as differing only in degree and not in kind from that of other great literature. The English Unitarians trace their descent from those Presbyterians whose ministers were ejected in 1662, and whose chapels are now mostly in Unitarian hands. The name Presbyterian is still largely retained. Many of the American congregationalists are also Unitarian in belief. A comparison of Unitarianism with Arianism and Socinianism may be made by reference to the articles on these subjects. Unitarianism still flourishes most in the districts which embraced it at the time of the Socini, and especially in Transylvania. In this country, during the reigns of Edward VI., Elizabeth, and James I., several persons expiated the offence of this form of heresy at the stake. During the Commonwealth, the first avowedly Unitarian society was gathered together by John Biddle, but did not survive him. A more stable organisation was that made in 1775 by Theophilus Lindsay, who had seceded from the Established Church in the preceding year. Unitarians, however, continued to suffer under various civil disabilities until 1812, when the last of these were removed. See J. H. Allen, *Historical Sketch of the Unitarian Movement*, 1883; Clarke, *Unitarian Belief*, 1884; and *Modern Unitarianism*, 1886; and the writings of W. E. Channing, J. Priestley, J. Martineau, and others.

United Free Church of Scotland, a Scottish Presbyterian body, formed in 1900 by the union of the United Presbyterian Church and the Free Church of Scotland (q.v.). This union was the result of a long series of negotiations prompted by a strong and general desire for reunion. To bring it about it was necessary to act contrary to the title deeds of the Free Church, and the small body who refused to take part in this act (the 'Wee Frees') successfully substantiated their claim to the property of the Church.

United Irishmen, a league founded in 1791 by Theobald Wolfe Tone, mainly in order to secure the political emancipation of Roman Catholics and Dissenters. Its members were, therefore, drawn from almost all the Irish religious bodies. Its organisation was largely a result of the movement connected with the French Revolution, and it was marked by a vigorous antipathy to everything English. It

brought about risings in the N. of Ireland in 1797 and 1798, marked by bloody atrocities. Help was expected from France, but none came, and the rebellion was subdued. See Madden's *The United Irishmen*, 1858.

United Provinces of Agra and Oudh (formerly called the North-Western Provinces and Oudh), in British India, is situated in the valley of the Upper Ganges. The province is bounded by Tibet, Nepal, Bengal, and the native states of Central India. The total area is 112,243 sq. m. The territory is mostly plain land, watered by the Ganges and the Rampur. To the N. a spur of the Himalayas encloses the border of the province. The climate is hot and rather unhealthy. Wheat, rice, barley, millet, maize, and sugarcane are grown in considerable quantities. The principal manufactures are cotton, leather, opium, sugar, and indigo. The United Provinces is governed by a governor-general acting under the

legislative council to advise and assist the lieutenant-governor in his duties, which is partly nominative and partly elective in its constitution. There are forty-four district boards, and a police force officered by Englishmen. In 1901 the population of the United Provinces was 47,691,782 for Agra and 34,858,705 for Oudh, of whom the vast majority are Hindus. The United Provinces is one of the most important of the Indian provinces, and contains such cities as Cawnpore, Benares, Agra, Allahabad, and Meerut.

United Service Institution, The Royal, situated in Whitehall. It was established in 1831 for the promotion of naval and military art, science, and literature. The museum (entrance 6d.) contains a famous Rubens ceiling, and models of Trafalgar and Waterloo, and many relics and trophies.

United States Weather Bureau, an institution of the same type as the British Meteorological Office. The official recording of weather commenced in 1870 under the Secretary for War, but in 1890 a bureau was established under the Department of Agriculture with headquarters in Washington and stations all over the U.S.A. The duties are primarily the recording of weather with a view to 'forecasting'; these are, in the States, of much greater importance inland than is the case in Britain, owing to the larger area and the occurrence of different climatic zones. Scientifically, the exploration of the upper currents of the air has been a valuable work. Weather observations were begun in the early part of the 19th century in connection with the army medical staff. In 1847 the

Smithsonian Institution, in 1869 the Cincinnati Observatory, commenced extended meteorological work. The true co-ordination of these efforts was finally brought about by the establishment of the Weather Bureau, and the publication of its reports.

United States of America: Geographical position and boundaries.—The U. S. lie roughly between 25° N. and 49° N. lat., and 69° W. and 125° W. long. The boundaries are the Atlantic Ocean on the E., the Gulf of Mexico and Mexico on the S., the Pacific Ocean on the W., and the Dominion of Canada on the N.

Surface.—The surface of the U. S. from E. to W. may be divided as follows: (1) The Atlantic Plain, which extends from the coast to the Alleghany Mts. (2) The Mississippi Valley and Great Central Plain, which extends from the Alleghany Mts. W. to the Rocky Mts. (3) The Western Highlands. (4) The Pacific Slope, which extends from the Rocky Mts. to the Pacific Ocean.

Mountains.—The chief mountain systems are the Appalachian region in the E. and the Rocky Mts. in the W.

1. The Appalachian system consists of very ancient rocks, which were elevated in former ages to a great height, and then reduced by erosive forces to a broad lowland. More recent elevation is responsible for some of the present ranges, while others are remainders of the earlier movements which have resisted erosive forces. The surface of this region to-day is a series of parallel ranges divided by fertile valleys. The various ridges are named as follows: the Blue Ridge, which lies nearest the Atlantic; the Kittatinny Chain; the Alleghany Mts., which lie in the western part of Virginia and the central part of Pennsylvania; the Cumberland Mts., on the eastern boundary of Tennessee and Kentucky; the Catskill Mts., in the state of New York, which are continued in the Saconago Chain; the Green Mts., in the state of Vermont; the Hudson River Highlands; and the hills of New Hampshire. There is no peak of marked elevation in the Appalachian region, the highest point being Mt. Washington in New Hampshire, which reaches a height of nearly 7000 ft.

2. The Rocky Mt. system is composed of comparatively recent formations, and in some parts elevation still goes on. Many of the ranges are antefinal, and many peaks rise to great heights. Volcanoes and extinct volcanoes are numerous. The U. S. Rocky Mt. system extends from 29° N. to 49° N. lat., a distance of about 2000 m. The system is continued in

Canada. The Rocky Mts. are not a single range, but are double and sometimes threefold. These ranges are the edge of a region of plateaux and hills which extends to the coastal mountains. The chief mountain ranges belonging to the U. S. Rockies are the Bitter Root Mts., the Blue Mts., and the Big Horn Mts. in the N.; the Wahsatch Mts., the Wind River Mts., and the White Mts. in the centre; and the Sierra Madre and the Sangra de Cristo Range in the S. The highest peaks are Mts. Harvard and Lincoln, both over 14,000 ft. In the western part of the southern Rockies lies the Great Basin of Colorado, with the Wahsatch Mts. on the E. and the Sierra Nevada on the W. This basin is extremely arid, has suffered much volcanic action, and is intersected by deep cañons cut by the rivers.

The W. of the highland region of the Western U. S. is bounded by the Pacific Mts. These consist of three ranges, the Sierra Nevada, the Cascade Range, and the Coast Range. These are broken only by the rivers which cut their way through to the coast. The descent from the hills to the coastal plain is very steep.

Coast.—The E. coast of the U. S. continues the Continental Shelf of Canada. This shelf was at one period in the geological history of the country completely uncovered, and at another period the whole of the present coastal plain, as well as the present Continental Shelf, was submerged. The Continental Shelf practically disappears off Florida.

The river valleys which cross the coastal plain and the Continental Shelf are now partially submerged, and so give safe and deep harbours. From the northern boundary of the U. S., as far S. as Cape Hatteras, the coast is low and sandy, but these river mouths make good harbours. From Cape Hatteras to Cape Sable, however, the coast is swampy, and, especially in Florida, fringed with lagoons. The harbours of this part of the coast are not good naturally. The coast of the Gulf of Mexico is low and very swampy.

There is only one considerable indentation on the E. coast of the U. S., the Gulf of Mexico, which runs in a northerly direction for an average

breadth of about 15 m. It is probable that the islands which lie between the Gulf of Mexico and the Atlantic were once part of the mainland, in which case what is now the gulf would have been a large inland sea analogous to the Mediterranean.

The Pacific coast of the U. S. has a very narrow Continental Shelf, and few bays or capes. Its only consider-

able indentation is San Francisco harbour, which is deep and safe.

Rivers.—The rivers of the Atlantic Plain rise in the Appalachian system, and are comparatively short. In many cases they are too rapid to be of much value for navigation, but are valuable as supplying water power. These rivers almost without exception have good harbours at their mouths. The chief are: the Hudson, the Delaware, the Susquehanna, the Potomac, the James, and the Savannah. The Hudson is the most valuable for commerce, as it is connected by the Erie Canal with Buffalo and the Great Lakes, while the Richelieu Canal connects it with Montreal.

The Great Central Plain is drained by the Mississippi-Missouri river system, the basin of which covers half the area of the U. S., and is equal in area to about one-third the area of Europe. The Mississippi rises in Lake Itasca in Minnesota, at about 1500 ft. above sea-level. After flowing for about 100 m. in an easterly direction it turns S., and is joined by numerous tributaries. The chief are: St. Peter's R., which joins the main stream 9 m. above St. Anthony's Falls; the Missouri, which enters the Mississippi just above St. Louis; the Ohio, which joins the main river at Cairo; the Arkansas, the Wisconsin, the Illinois, and the Red R. The whole course is about 4200 m.

The Mississippi-Missouri has made a broad flood plain, varying in width from 30 to 60 m. This plain is subject to severe inundations, for it slopes very gently away from the river bed, which is in many parts of the river above the level of the surrounding plain. The river carries a vast amount of silt, which it deposits at its mouth, thus forming a delta which stretches a series of long narrow tentacle-like arms seaward.

Other rivers falling into the Gulf of Mexico are the Mobile and the Rio Grande. The Mobile, which enters the gulf at the town of Mobile, is the union of the Alabama (600 m. long) and the Tombigbee. The Rio Grande (about 1100 m. long) forms the boundary between Texas and Mexico.

The rivers flowing into the Pacific are comparatively short, owing to the nearness of the coast ranges to the sea. The Colorado R. flows into the Gulf of California, after crossing an arid plateau. It has cut for itself a deep cañon with almost perpendicular banks, in many places more than a mile high. This cañon is over 200 m. long.

The San Joaquin and the Sacramento rivers unite and flow into the harbour of San Francisco; these and the Columbia are the only important rivers on the W. of the U. S.

The Great Basin of California is largely an area of inland drainage. The rivers flow into lakes with no outlets to the sea.

Lakes.—Of the Great Lakes of N. America Lake Michigan lies within the U. S., and the southern shores of Lake Ontario, Lake Erie, Lake Huron, and Lake Superior are U. S. territory. These lakes were formed by the action of the glacier which once covered the continent as far S. as the forty-second parallel, roughly speaking. They are remainders of much larger lakes and are of the utmost importance as waterways. Now England has very many smaller lakes which are also the result of glacial action. The largest lake of the U. S., apart from the Great Lakes, is the Great Salt Lake of Utah. The extremely low rainfall of this region and the intense evaporation consequent upon the high temperature are responsible for the salinity of the waters of the lake.

Natural wonders.—Of the great natural wonders the chief are the Niagara Falls, the Grand Canyon of Colorado, and Yellowstone Park.

Climate.—A country as large as the U. S. and one having so wide differences of elevation, must necessarily have a climate of wide differences of temperature and of rainfall.

Temperature.—In summer the hottest region of the U. S. is the Great Basin of California, which in July has an average temperature of over 90° F. The eastern coast has an average July temperature of between 70° and 80°, while the average July temperature of Florida, of the Gulf Coast, and of the more western part of the Central Plain, is between 80° and 90°. Owing to the tempering influence of the Pacific, the average July temperature of the W. coast is slightly lower. In winter the isotherms tend to run in almost parallel lines, curving slightly N. over the W. coast, and slightly S. over the Central Plain. The average January temperature of the extreme S. of Florida is 70°, that of the greater part of the W. coast is between 50° and 60°, while the greater part of the E. coast averages in January a temperature between 50° and 32°, the temperature gradually decreasing as we go N. This applies also to the Central Plain. The S.E. states, therefore, have almost a sub-tropical climate, without any extreme variation between the winter and summer temperatures. The eastern and central states are subject to much greater variations of temperature, while the western coast is less extreme in climate than are the other parts of the U. S. The rainfall is heaviest in Florida, in the Gulf

States, and on the E. coast; it gradually decreases towards the W.; California and Colorado are very dry, and the northern part of the W. coast has an abundant rainfall. The rainfall on the E. coast is steady and greater than that of England. The rainfall in the Gulf States is heavier and is chiefly monsoonal in character, falling mainly in the summer. The winds from the Pacific bring rain to the W. coast, but the Sierra Nevada Mts. shut these winds off from the Great Basin of California, which has an average yearly rainfall of less than 10 in. The climate of the Central Plain is rendered colder in winter owing to there being no shelter from the winds blowing from the N. The Central Plain and the New England States have heavy snowfalls in winter, while perpetual snow lies on the summits of the Rockies and of the Coast Ranges.

Vegetation.—Great variety marks the vegetation of the U. S. In its natural state the eastern coastal plain and the eastern highlands were covered with temperate forests; the chief trees of these forests were the maple, the birch, the red pine, the white pine, and the spruce. These have, of course, been largely cut down. The southern states (the Gulf States) have some sub-tropical forest trees, which yield woods valuable in commerce. The western coast forests are extensive, and are noted for the enormous size of some of their trees, which are mainly spruce, cedar, redwood, and the Sequoia pine. The Central Plain was originally covered on the E. with mixed forest and grass lands, which merged into grass lands without forests to the W. as the rainfall decreased. This district is now the great wheat and grass area of the U. S. The Great Basin region has not much vegetation, what there is is mainly of a desert type, though where irrigation works have been successfully carried out this region has proved itself capable of supporting a luxuriant vegetation. Maize, potato, tomato, pumpkin, tobacco, were unknown in Europe until introduced from America.

Animals.—The Central Plains of the U. S. were once the haunt of the bison, but these are now almost exterminated, though herds are still preserved with sedulous care in the Yellowstone Park district. Other indigenous animals are the grizzly bear, which belongs to the Rockies, the opossum, the prairie dog, and various kinds of deer. The fish include cod, halibut, mackerel, shad, and salmon. Many varieties of fresh-water fish are found in the lakes, including the white fish, the trout, and the sturgeon.

Minerals.—The U. S. is rich in almost every kind of mineral. There are seven main coalfields in the U. S., the Appalachian field, the Central Western field, the Rocky Mt. field, the Michigan field, the Richmond Basin field, and the Pacific coast field. The only important source of anthracite coal is Pennsylvania. No less than twenty-three states produce iron in considerable quantities. The most productive iron mines are in the neighbourhood of Lake Superior; the most valuable mines apart from these are in the southern Appalachian region. The Lake Superior district is rich also in copper, which is found almost in its pure state. The eastern states are rich also in petroleum and in natural gas. Pennsylvania is the largest producer of these commodities. Copper is found also in Montana, in Arizona, and in Michigan. The U. S. produces more than half the world's supply of copper. Zinc is found in Kansas and in Missouri. Gold is found in the western states, especially in California. It is found also in Alaska. Silver is found in Montana, Idaho, Washington, Oregon, Nevada, and California. Large supplies of kaolin are found in the eastern states; some sulphur is mined in Nevada and Utah. Considerable quantities of marble are quarried in Vermont; sandstone is found in Ohio, Pennsylvania, Connecticut, and New York.

Productions.—The U. S. is one of the most productive countries in the world. Her mineral wealth has already been shewn, and her vegetable and animal wealth is not inferior. Her extensive forests give large supplies of lumber, the chief woods of commercial value being the white pine, the hemlock, the redwood, oak, spruce, fir, and long-leaved and short-leaved pine. The southern states and the lake region supply the greatest amount of lumber; the Pacific and New England States supply a somewhat smaller amount. Turpentine, tar, and resin are also obtained from the forests. Wheat, oats, barley, and maize are the chief cereals grown. Wheat is grown chiefly in Washington, Minnesota, Indiana, Dakota, Ohio, and Oregon. Oats and barley are grown in the same districts, barley is grown also in California. Maize is largely grown for fattening cattle, chiefly in Kansas, Nebraska, Iowa, Illinois, Missouri, Indiana, and Ohio. Rice is grown in the swampy parts of Louisiana and Texas. Tobacco is grown in Kentucky, Maryland, N. Carolina, Wisconsin, and Louisiana. Sugar is grown in Louisiana, but beet sugar also is manufactured from beets

grown in Michigan and California. *Cotton* is very largely grown in the U. S., in the south-eastern part of the country and is of Georgia, S. Carolina, and Florida, and the 'upland' cotton, which has a short thread. This is grown on the inland of the south-eastern states. *Flax* is grown in the U. S. mainly for its seed. The chief centre for it is Minnesota.

Stock farming.—Sheep, cattle, pigs, and horses are largely reared in the U. S., for pasturage is cheap and plentiful. Cattle and sheep are raised chiefly in the Great Central Plain, the sheep for their wool. Pigs are raised in Iowa, though all the maize-growing states have some pigs. Horses are raised largely in Texas, and mules in the southern and western states. Poultry and eggs are important in the export trade.

Manufactures.—The U. S. have every advantage as a manufacturing country. Coal and iron supplies are abundant; there is an abundance of water power in the eastern states; water communication, both natural and artificial, is excellent. The chief manufactures are those of iron and steel, cottons, woollens, and food preparation. The chief iron manufactures are in Pennsylvania, Alleghany county being the most important district, and Pittsburg the most important town. This state manufactures mainly steel for bridges, frames of buildings, rolled steel, nails, etc. Tools and cutlery are manufactured in the New England States, agricultural implements in Illinois and Connecticut. *Machinery* is largely made in Chicago, New York, Pittsburg, Philadelphia, and Cleveland. Steel shipbuilding goes on at Philadelphia, San Francisco and other ports. Cottons are manufactured, mainly on the eastern Coastal Plain. The atmosphere is here sufficiently damp for the thread, and the line of falls by which the rivers descend from the Appalachian hills to the plain supplies abundant water power for the working of the machinery. Some of the cotton growing states, e.g. S. Carolina, manufacture as well. Woollens are manufactured mainly in the New England States, more especially in Philadelphia and New York. The manufactures include men's suitings, women's dress goods, carpets, and felts. Silk is manufactured in New Jersey, New York, and Pennsylvania. Food manufactures and industries are important. They include the preparation of cattle, sheep, and pigs for export. Chicago, Omaha, and Kansas City are

the largest centres for this industry; from this industry arises leather making, whose chief districts are New York, Philadelphia, and Worcester in Massachusetts. Flour milling is carried on mainly at Minneapolis, St. Paul, and at Superior. Fruit and salmon are canned very largely on the Pacific coast. Other very important industries are glass making, boat making, ready-made clothing manufacture, and coopering.

Communications and railways.—The great rivers and the great lakes of the U. S. render communication easy. The latter, with the 'Soo' Canal and the Canadian Canal, gives unbroken connection between Oswego on Lake Ontario, and Duluth at the western end of Lake Superior, a distance of over 1000 m. Chicago is connected by water with the Atlantic by means of the lakes, the Erie Canal, and the St. Lawrence R. The railroad mileage of the U. S. is enormous, amounting to over 213,000 m. The chief railways are the Northern Pacific, which runs from Chicago, through Duluth, to Portland, Oregon, whence branch lines run to Puget Sound and San Francisco; the Union and Central Pacific Railway, which runs from Chicago to Omaha, Cheyenne Ogden (Salt Lake City is on a branch line from Ogden) to San Francisco; the Southern Pacific Railway runs from New Orleans W. across the Rockies to Los Angeles and San Francisco. There are also coast lines from New York to Jacksonville, New York to New Orleans, and lines from Chicago to New Orleans, and from Kansas to Washington. Other great lines are the Pennsylvania and New York Central, both systems communicating between the East and Chicago, and having numerous branches. There are several connections with Canada.

Trade.—The U. S. has a very large coasting trade, the main ports for this being New York, Philadelphia, Baltimore, to Charleston, New Orleans and Galveston on the E. and S. coasts. On the W. coast the chief ports for the coasting trade are San Francisco, Puget Sound, and Portland. The foreign trade is also very large, the total exports from June 1911 to June 1912 amounting to £465,308,200, and imports amounting to £349,846,300. The U. S.'s best customer is the United Kingdom. The chief steamship lines are between New York and Bremen, London, Southampton, Liverpool, and Hamburg. Boston also has regular communications with Liverpool, London, Glasgow, and with the chief Canadian ports. Baltimore, Philadelphia, and New Orleans are important ports for trade with the United Kingdom and

for Europe. The chief port of the W. coast is San Francisco, which trades with England, S. America, Japan, China, and Australasia.

Exports.—The chief exports of the U. S. are cotton, raw and manufactured, wheat and wheat flour, coal, iron, both raw and manufactured; copper, oils, lumber, cattle; tinned meat, fruit, and fish; hides, and tobacco. One third of the exports are of manufactured goods. The chief imports are coffee, tea, cocoa, india-rubber, hides and skins, vegetable fibres, sugar, tobacco, silk, chemicals, drugs, lead, raw and manufactured, rice, spices, and wines.

Population.—The figures for the 1910 census are gradually becoming available. They show a total pop. of 101,467,302. In this total are included 81,732,687 whites; 9,828,294 negroes; 265,683 Indians; and 142,666 others of Mongol origin. Owing to the vast immigration into the U. S., the pop. is extremely mixed. Of the whites mentioned above, 13,343,583 are foreign-born, and this, of course, takes no account of the enormous number of descendants of foreign immigrants; 2,499,200 of the foreign-born whites come from Germany, emigration from which, however, is on the decline. Emigration to the U. S. from Italy, Russia, Austria, and Mexico is rapidly increasing. The table on p. 371 gives particulars as to pop. in the various states, with certain other particulars.

HISTORY: (1) Discovery and colonization.—The earliest inhabitants (N. American Indians or Red Indians) were of Mongol extraction (see AMERICAN INDIANS). There is abundant evidence that some parts of America were known to Norse adventurers from Norway as early as the 10th century. But there do not appear to be many traces of their having made permanent settlements. It is possible that some vague rumours of their journeys had come to the ears of Christopher Columbus (*q.v.*) when he set out on Friday, Aug. 3, 1492, to discover the western route to India. He sighted one of the Bahama Islands on Oct. 12, and landed the following day. After cruising about for some time, he returned to Spain. He made in all four voyages to the New World for treasure-getting and discovery. His discoveries never extended beyond certain of the W. India Islands, and parts of Central America. Among the earliest of his followers was Amerigo Vespucci (*q.v.*), who in 1497-98 explored the coasts of the Gulf of Mexico, and who has given his name to the whole continent. In 1498 John and Sebastian Cabot sailed

along the E. coast of America from Labrador to Cape Hatteras. The shores of the Gulf of Mexico and modern Florida were explored by Pineda, Ponce de Leon, and Ayllon—all Spaniards—between 1513 and 1521. In 1521 Fagundes, a Portuguese, discovered the mouth of the St. Lawrence.

During the early part of the 16th century French settlements were made along the St. Lawrence, and Spanish settlements in Florida and the south of N. America. In 1585 at the instigation of Raleigh a party of English colonists went out and founded the colony of Virginia, so-called in honour of 'the Virgin Queen,' Elizabeth. All perished or returned to England. In 1607 another attempt to colonise Virginia was made, and after many disasters it was successful. Religious persecutions led to the founding of further colonies in the 17th century. In 1620 the band of Puritans commonly known as 'The Pilgrim Fathers' fled in the *Mayflower* from persecution and were founders of what were later the New England States. The foundation of Massachusetts by the Puritans followed soon afterwards. By the middle of the century settlements extending over some five hundred miles of coast had been made by Puritan emigrants. During the Commonwealth and Protectorate these colonies consistently supported the parliament and the army. After the Restoration, however, an attack was made on their liberties and privileges. The work of destroying the democratic constitutions of these colonies was entrusted by James II. to Sir Edmund Andros. His efforts were fiercely resisted, and were stopped by the accession of William III. Meanwhile, a group of colonies to the S. of the New England States had been growing up. In 1632 the Roman Catholic colony of Maryland had been founded by Lord Baltimore. But within very few years it became Protestant in feeling. In 1663 N. and S. Carolina were founded, the settlers being chiefly episcopalian.

In 1664 the Dutch settlement of New Netherland between New England and Virginia was seized in an unprovoked manner by New York. The Dutch of the land E. of the Delaware and round its mouth which, originally a Swedish settlement, had come into the hands of the Dutch in 1655 (the modern New Jersey). Both were reconquered by the Dutch in 1673, but ceded again in 1674.

In 1681 Pennsylvania was founded by the Quakers under William Penn

State and Abbreviation		Date of Admission to the Union	Gross Area ² in square miles	Population	Capital
Alabama	Al.	1819	51,998	2,138,093	Montgomery
Arizona	Ariz.	1912	113,956	204,354	Phoenix
Arkansas	Ark.	1836	53,335	1,754,449	Little Rock
California	Cal.	1850	158,297	2,377,549	Sacramento
Colorado	Col.	1876	103,948	799,024	Denver
¹ Connecticut	Conn.		4,965	1,114,756	Hartford
¹ Delaware	Del.		2,370	202,322	Dover
Florida	Fla.	1845	58,666	752,619	Tallahassee
¹ Georgia	Ga.		59,265	2,609,121	Atlanta
Idaho	Id.	1890	83,888	325,594	Boisé
Illinois	Ill.	1818	56,665	5,638,591	Springfield
Indiana	Ind.	1816	36,354	2,700,876	Indianapolis
Iowa	Ia.	1846	56,147	2,224,771	Des Moines
Kansas	Kan.	1861	82,158	1,690,949	Topeka
Kentucky	Ky.	1792	40,598	2,289,905	Frankfort
Louisiana	La.	1812	48,506	1,656,388	Baton Rouge
Maine	Me.	1820	33,040	742,371	Augusta
¹ Maryland	Md.		12,327	1,295,346	Annapolis
¹ Massachusetts	Mass.		8,266	2,366,416	Boston
Michigan	Mich.	1837	57,980	2,810,173	Lansing
Minnesota	Minn.	1858	84,682	2,075,708	St. Paul
Mississippi	Miss.	1817	46,865	1,797,114	Jackson
Missouri	Mo.	1821	69,420	3,293,335	Jefferson City
Montana	Mont.	1889	146,997	376,053	Helena
Nebraska	Neb.	1867	77,520	1,192,214	Lincoln
Nevada	Nev.	1864	110,690	81,875	Carson City
¹ New Hampshire	N.H.		9,341	430,572	Concord
¹ New Jersey	N.J.		8,224	2,537,167	Trenton
New Mexico	N.M.	1912	122,634	327,301	Santa Fé
¹ New York	N.Y.		49,204	9,113,614	Albany
¹ N. Carolina	N.C.		52,426	2,206,287	Raleigh
N. Dakota	N. Dak. or. N.D.	1889	70,837	577,056	Bismarck
Ohio	O.	1803	41,040	4,767,121	Columbus
Oklahoma	Okla.	1907	70,057	1,657,155	Oklahoma City
Oregon	Ore.	1859	96,699	672,765	Salem
¹ Pennsylvania	Pa. or Penn.		45,126	7,665,111	Harrisburg
¹ Rhode Is.	R. I.		1,248	542,610	Providence
¹ S. Carolina	S.C.		30,989	1,515,400	Columbia
S. Dakota	S. Dak. or S.D.	1889	77,615	583,888	Pierre
Tennessee	Tenn.	1796	42,022	2,184,789	Nashville
Texas	Tex.	1845	265,896	3,896,542	Austin
Utah	Ut.	1896	84,990	373,351	Salt Lake City
Vermont	Vt.	1791	9,564	355,956	Montpelier
¹ Virginia	Va.		42,627	2,061,612	Richmond
Washington	Wash.	1889	69,127	1,141,990	Olympia
W. Virginia	W. Va.	1863	24,170	1,221,119	Charleston
Wisconsin	Wis.	1848	56,066	2,333,860	Madison
Wyoming	Wy.	1890	97,914	145,965	Cheyenne
Dist. of Columbia	D.C.	1790 ³	70	331,069	Washington
		Date of Acquisition			
Alaska		1868 ¹	590,884	64,356	Juneau
Hawaii		1900	6,449	191,909	Honolulu
Philippine Islands		1898-99	115,026	7,635,426 ⁵	Manila
Porto Rico		1898	3,435	1,118,012	San Juan
Gnam		1898	210	9,000 ⁵	Agaña
Panama Canal Zone		1904	436	50,000 ⁵	
Samoa					
Tutuila		1899	77	6,100 ⁵	

¹ The original thirteen states.² Gross area represents land and water.³ Organised.⁴ Purchased.⁵ Estimated.⁶ 1903.

(q.v.), who fixed his capital at Philadelphia. Thus by the time of the Revolution of 1688, the American colonies of England extended along the coast from the Savannah R. to Fundy Bay. By the same date French fur-traders and Roman Catholic missionaries, who had been busy exploring and acquiring territory to the N. and W. of the English colonies, had planted settlements in Canada. They had further explored the Great Lakes, and established missionary posts along them, and they had made discoveries along the Mississippi, and certain of its tributaries.

During the first half of the 18th century, the English colonies flourished, and the number of the colonists was increased by immigration, not only from England, but from Germany also, where the havoc played by war caused many to seek a more peaceful home beyond the seas. The beginnings of slave labour in the southern states are traceable to this period. This period also saw the foundation of an efficient educational system in the middle colonies and the New England States. Such names as those of Franklin, Bartram, Jonathan Edwards, and Rittenhouse, are a sufficient proof that the education provided was in no way inefficient. There are disputes between questions, but ceded in agree

In 1732 Georgia was founded, being the last of 'the old thirteen.' This was done, in the face of Spanish opposition, largely owing to the efforts of John Oglethorpe, who must be regarded as the founder of the colony.

Twelve years later, England and France found themselves engaged in a deadly struggle over the question of the Austrian succession. The conflict was not confined to the mother countries, but extended to all the parts where the two nations were living in proximity and rivalry. In 1744 the New England colonists, inspired by religious, commercial, and racial motives, attacked and took Louisbourg, the capital of Cape Breton, a town of great strategical importance. William Pepperell, a merchant, was the English leader. The town was restored by the treaty of Aix-la-Chapelle, which, however, did nothing to settle the respective boundaries of the French and English dominions in America. Fighting, therefore, went on, the English colonies meeting at Franklin's instigation to draw up a plan for their mutual defence on July 4, 1754. In 1755 an English force under Brad-

dock, assisted by a number of the colonists, attacked and captured Nova Scotia and Acadia, deporting the French settlers to various parts of the English colonies. Longfellow's *Evangeline* deals with this incident. Braddock was killed shortly after the battle of the Clouds. Duquesne, the French fort at the mouth of the Ohio, was captured by the British in 1755. Washington.

In 1757 the French being at this time in possession of nearly all the points of strategical importance. Supplies and men were speedily forthcoming from all the English colonies, and troops were sent over from England. In 1758 Wolfe captured the mouth of the St. Lawrence, and Forbes acquired the site of Fort Duquesne (modern Pittsburgh). In 1759 followed the famous battle of Quebec, in which the English under Wolfe defeated the French under Montcalm. Both leaders perished in the battle. Montreal and the W. of Canada came into English hands soon afterwards. England was now supreme in N. America. At the peace of Paris in 1763 Canada, French Louisiana, and W. Florida were ceded to England by France. East Florida was relinquished by Spain, who obtained in compensation Havana and all Louisiana to the W. of the Mississippi.

(2) *American independence.*—The war left the colonies impoverished in men and money, but it had shown them what a small and well-disciplined force could accomplish with capable leaders. England, too, was in need of money. The war had cost her some £14,000,000 and she had to look for income. regulative

been ass... the mother countries from the earliest times. This privilege had been grossly abused, and the most absurd restrictions placed on colonial trading. In addition to this, duties had been imposed on various articles of importation, notably on sugar. In 1764 the sugar duties were somewhat reduced by Grenville, the then premier, but fresh imposts were laid on commodities which had been hitherto untaxed. In 1765 a Stamp Act was passed, requiring all newspapers and legal documents to be stamped. The Act was received with great indignation in America, but George III. and Grenville turned a deaf ear to remonstrance. Riots broke out in many places in the colonies, while Franklin wrote 'The sun of liberty is set.' In Virginia, Patrick Henry, a young lawyer, sprang into prominence by delivering before the State Assembly a passionate

oration full of seditious sentiment. A congress which met at New York protested vigorously, and claimed exemption from taxation to which they had not consented. Meanwhile, Rockingham had succeeded Grenville, and, largely owing to the efforts of Wm. Pitt and Lord Camden, the Stamp Act was repealed in 1766. The repealing Act was accompanied, however, by a declaration that 'parliament had a right to bind the colonies in all cases whatever.' Pitt succeeded Rockingham, Charles Townshend being made Chancellor of the Exchequer. Taking advantage of Pitt's illness, Townshend introduced, in 1767, a bill for taxing glass and other articles imported into the colonies. Again, great dissatisfaction was felt in America. In 1769 Boston was occupied by British troops, who were to preserve order in the town. Ill-feeling between the two countries rapidly matured. In 1773 the 'Boston tea-party' incident occurred, owing to what the colonists regarded as an underhand way of attempting to tax them, when 340 chests of tea were thrown into Boston harbour. In 1774 an enlarged Congress made another and more vigorous protest against English attempts at taxation, and voted an address to the king. Parliament refused to give way in spite of the eloquent appeals of Pitt and Burke. War became inevitable. In the first engagement (Lexington, 1775) the British under Gage sustained a severe defeat. In the second battle (Bunker's Hill, 1775), they were no more successful.

Washington was now chosen as commander-in-chief, and his efforts at introducing discipline were at once attended with success. In 1776 he compelled the English to evacuate Boston, and marched against New York. After several further American victories, Congress refused to consider themselves as holding authority from England. In June a committee was appointed to draw up a declaration that the colonies were 'free and independent states.' The statement adopted was drawn up by Thomas Jefferson. On July 4, 1776, this Declaration of Independence was passed by the unanimous votes of Congress, the thirteen states represented thus becoming the U. S. Meanwhile, Howe had been sent out by England with reinforcements and offers of indemnity on submission. The colonists were defeated at Long Island, and this was followed by other colonial misfortunes. At the end of the year Washington surprised and defeated the English forces at Trenton. With the beginning of 1777 the fortunes of the colonists rose. Help

was obtained from France, and General Burgoyne, who had hitherto been very successful, was forced to make a complete capitulation at Saratoga. Washington was, however, defeated at Brandywine R. in September; 1778 saw more time wasted in efforts at conciliation and in indecisive fighting. In 1780 things looked bad for the colonies. Cornwallis took S. Carolina and defeated Gates near Camden. Further British victories followed in the southern states, but the victorious career of Cornwallis was cut short in 1781. He and his forces were blocked up at Yorktown in Virginia, and as the expected relief did not come he was forced to capitulate almost unconditionally on Oct. 19. This ended the war. In 1782 England was forced to recognise the independence of the U. S. Washington was the hero of the day in America. There were those who would have wished him to become king, but he disdained the offer.

(3) *The United States a republic.*—

(i.) The war had left the U. S. impoverished and exhausted. The army were at first disposed to be troublesome, but were pacified by the assurances of Washington. The seat of government was fixed at a federal city to be prepared for the purpose between Maryland and Virginia, and to be known as Washington. A system of decimal coinage was adopted in 1785. The great business, however, of these first years of independence was the settlement of a constitution. In Aug. 1787, a rough draft of this was prepared. It provided for the vesting of all legislative and financial matters in Congress, which was to consist of two houses. The executive was to be vested in a president, who was to hold office for four years. Provision was made for the erection of proper judicial tribunals, and for regulating the relations between one state and another. This rough draft underwent some alteration during the discussions in Congress, but it was substantially the same as the Constitution of the U. S. to-day.

The first president chosen under this Constitution was George Washington (1789) (q.v.). Alexander Hamilton, who served with distinction in the war and helped to draft the Constitution, proved a considerable power, perhaps only second to Washington, during the next few years. He organised the finances of the country and did much toward the creation of central government. In 1790 Rhode Island was added to the Union. In the same year skirmishes in Georgia and Indiana led to some loss of life. Washington was re-elected president in 1793. Trouble with the

Indians continued, but Wayne inflicted on them a decisive defeat on the R. Maumee in 1795, and a treaty of peace was signed at Greenville.

In the previous year the government had been troubled by an insurrection among the Democratic party in Pennsylvania, who protested in arms against the duties on spirits. Washington took a stern view of the case, and adopted summary measures. After the seizure of several of the leaders, Washington increased the reverence in which he was held by treating the offenders with great leniency. In 1795 another war with Great Britain seemed imminent, but was avoided by the diplomatic skill of Washington. The year 1797 saw Washington's farewell to Congress, and as he refused to undertake another term of office he was succeeded as president by John Adams (1735-1836). Adams had been a teacher in early life, and had been one of the first to enunciate republican views. Like Washington he was a Federalist. Scarcely had he been elected when war with France seemed to threaten, but the victory, gained in an hour and a half, of the American frigate *Constellation* over the French *L'Insurgent*, led to the conclusion of a treaty of peace. On Dec. 14, 1799, Washington died of pneumonia. The House of Representatives declared him to have been 'First in peace, first in war, and first in the hearts of his countrymen.' The presidential elections of 1801 saw Thomas Jefferson (1743-1826), who called himself a Republican, but whose views in some ways resembled rather those of the modern Democratic party, who claim descent from the Republican party, made the third president. A census taken in 1800 gave a population of 5,308,483, showing the remarkable increase of 1,500,000 in ten years. This argued prosperity, and the growth of prosperity was aided by the administration of Jefferson. (For his share in drawing up the Declaration of Independence, see above.) Earlier, he had come into prominence as a member of the Virginian Congress, and he had acted as American ambassador at Paris. Under Adams (1797-1801) he had been vice-president. His democratic sentiments soon manifested themselves in the temperate programme of peace and he put before Congress.

was added to the Union. The most remarkable event of Jefferson's presidency was the acquisition of Louisiana. The vast territories of Louisiana to the W. of the Mississippi had been ceded to France by Spain secretly, in 1800. The news of this

came to Jefferson's ears in 1801, and he prepared to resist the arrangement. But, in 1803, the French, fearing that the English might take it, offered to sell it to the U. S. for 80,000,000 francs (\$15,500,000 or £3,200,000). Monroe, who had been commissioned to treat merely for the purchase of New Orleans and the Floridas, hastened to close with the offer. The U. S. thus, for a trifling sum, doubled her territories and became possessed of a new and rich field for her people's activities. This was Jefferson's greatest achievement, though he was not alone responsible for it. Shortly afterwards Illinois

1801 (the U. S. Supreme Court must be regarded as an event of enormous importance in the constitutional history of the country. For thirty-four years, until his death, he continued to expound with great force the functions of national government and to exert an influence upon legislation that has proved lasting. In 1805, the Constitution having been slightly revised, Jefferson was re-elected president. In 1807 great annoyance was caused by the assumption by Britain of the right to search neutral vessels and by the high-handed action of the *Leopard* in searching the American frigate *Chesapeake*. American shipping being injured by both the orders in council and the Milan decree, Congress placed an embargo on foreign trade. This was repealed in 1809. In 1809 Jefferson having refused re-nomination, James Madison (1751-1836) was elected president. The fourth president, who was a lawyer by profession, was a follower of Jefferson's creed, and like him was the son of a planter. His presidency covers the period of the war with England. This unhappy struggle was largely caused by the obstinacy of Canning, who refused to entertain negotiations for the opening of free trade with the U. S., while Napoleon did his best to foment strife. In March 1811 Congress refused

England. The war drifted on, and the American people were aroused by the news of the battle of Tippecanoe. The war was thought to be inspired by England. Madison supported the war party, and did his best to secure evidence of British hostility to the U. S. In June 1812 war was formally declared. An American attack on Canada failed, but at sea the U. S. met with great success. The English frigates were repeatedly defeated in naval duels. The land forces were also defeated. The total of

THE
PRESIDENTS OF THE
UNITED STATES OF AMERICA
(1789-1913)



1. GEORGE WASHINGTON (1789-97).
Federalist.



2. JOHN ADAMS (1797-1801).
Federalist.



3. THOMAS JEFFERSON (1801-9).
Republican.

gains and losses about equal. In 1814 a rising of the Creek Indians was subdued by Jackson at the battle of the Horseshoe. The Indians never again gave considerable trouble. The famous naval duel between the English *Shannon* and the American *Chesapeake*, resulting in an English victory, completed the story of these fights, in all but the last of which the U. S. had been successful. The U. S. attempt to conquer Canada was responsible for much bloodshed, but resulted in no substantial gain to either side. In the course of the war Washington was taken, sacked, and burnt (1814). A treaty of peace was signed at Ghent a few days before the American victory at New Orleans (1814). The treaty left nearly all the points of difference unsettled, but the English were forced to give up the more arrogant of their claims before the war. The next few years are not marked by events of any great importance; Congress was chiefly engaged in the consideration of matters of domestic importance, and it was in these years that the demand for protection for American industries began to come into prominence. In 1817 Monroe (1758-1831) succeeded Madison, who followed precedent in refusing re-nomination. A lawyer in early life, he had fought for Independence and into public life (see Louisiana, above). He was American representative in Paris during part of the Revolution. As president he was the lineal successor in views to his immediate predecessors. He was particularly lucky in his subordinates. Few men have had so keen a sense of the public feeling as Monroe. He speedily put an end to the border skirmishing in the S. between Indians and whites (1817-18). In doing so, however, he came into conflict with Spain. But by a treaty of Feb. 1822, Florida was secured to the U. S., and a territorial government was set up in the next year, Spain gaining Texas. The request of Missouri to be admitted to the Union led to the reopening of the question of the slave trade: Should Missouri be admitted as a slave-owning state or only on conditions? The matter was settled by the 'Missouri Compromise,' which admitted a part of Missouri to the Union unconditionally but prohibited slavery to the N. of the line 36° 30'. In 1823 was promulgated the policy always known as the 'Monroe doctrine,' which is the foundation of the U. S. foreign policy. The occasion was the attempt of the 'Holy Alliance' (q.v.) to stamp out republicanism in S. America. The U. S. saw in this a danger to her own

democratic principles, and moreover did not wish America to be embroiled in European quarrels. Monroe rose to the occasion, and in his message to Congress Dec. 2, 1823, said that the U. S. could not see her 'free and independent condition' assailed by European interference in America. He pointed out that the alliance had a different political scheme from that of America, and declared that the U. S. would consider any attempt on the allies' part 'to extend their system to any portion of this hemisphere as dangerous to our peace and safety.' The U. S. would not interfere with European colonies in America, but with governments whose independence they had acknowledged they would not brook interference. The American continent must, further, not be regarded as subject to future colonisation by European powers. The Monroe doctrine thus does not establish a protectorate of the U. S. over other American countries. But in its practical bearings it does mean that the U. S. has to defend the rest of America from European intervention, and to allow the American nations 'to work out their own destinies.'

(4) *The United States a republic.*—
(ii.) Monroe was succeeded as president in 1825 by John Quincy Adams, the son of the second

sors he was distinguished. A very strong supporter of the Federalists, he became, after the passing of the Embargo Bill, a follower of Jefferson, though his opinions were still Federalistic. He held several official posts before obtaining the presidency. He was elected by the House of Representatives after the electors had cast a majority, though not a sufficient majority, of votes for Jackson. A good man and a skilful statesman, Adams had not the power of enlisting popular sympathy. His presidency is marked by the opening of the first American railway, and by the opening of the Erie Canal. In 1829 he was beaten for the presidency by Andrew Jackson (1767-1845), also a lawyer. He had done much fighting against the Indians, first as a private soldier and later as general.

be overlooked. During Adams's presidency he was continually in opposition to the president, seeking occasion of election was to not very tactics. He in the party sense and in the other;

personally as attractive as his predecessor was unattractive, he is still remembered as 'the People's President.' It was he who inaugurated the system of a wholesale change of office-holders with the accession to power of a new party. The year 1829 saw widespread dissatisfaction in the S. with the tariff laws, which, they considered, gave protection to manufactures without adequate protection of agriculture. Threats were even made of secession. In Jan. 1830 Webster made a wonderful reply in Congress to this threat. No more was heard of secession. In 1832 a nullification proclamation, refuting the right claimed by S. Carolina to nullify certain tariffs settled by Congress, was issued by Jackson, and won him popularity in the N. of the U. S. In 1833 a compromise tariff was agreed upon, reducing all rates over 20 per cent. Jackson was re-elected in 1833. He made a determined attack on the National Bank, which led to its being closed in 1836. This and other unwise acts led to a financial crisis in 1837. The presidential elections of this year resulted in the choice of Jackson's nominee, Martin van Buren (1782-1862), a man of Dutch extraction, a political adherent of Jackson, and also a lawyer. He entered politics at eighteen, and speedily rose to office, being in succession attorney-general, governor of New York, a member of Jackson's cabinet, and American ambassador to England. His first address touched on the subject of slavery, and proposed a plan for dealing with the financial panic—that of 'the independent treasury.' This was embodied in the Sub-Treasury Bill (1837-40), which was finally passed in 1840, though the financial situation had improved in the meanwhile, only to lead to a second panic. In 1841 Van Buren, standing as an Independent Democrat, was defeated by the Whig nominee, William Henry Harrison (1773-1841), a descendant of the English regicide. He had successfully governed Indiana, but though solid, sincere, and practical, he had few of the higher gifts of statesmanship. He died within a month of his election, and was succeeded by Tyler, the vice-president (1790-1862), a Democrat. Tyler had taken some part in public life, but was little known to the majority. He expressed his intention of following Harrison's policy, but came into conflict with the Whigs on the tariff question of 1842. In 1843 the Webster-Ashburton treaty, the credit for which on the U. S. side lay between Webster and Tyler, was made between the U. S. and England for the suppression of African slave-traders. The southern

states now began to press for the annexation of Texas. On this cry James Knox Polk (1795-1849) was elected president in 1845. He had been a supporter of Jackson and Speaker of Congress. In 1845 Texas was annexed and her representatives admitted to Congress. War with Mexico followed. Taylor defeated the Mexicans at Palo Alto and elsewhere. He gained a brilliant victory at Buena Vista, and Scott another at Cerro Gordo. In 1848 a peace was concluded, ceding to the U. S. Texas and a large stretch of land to the W. This result was a great triumph for the pro-slavery party. In 1846 Oregon had been annexed. In 1849 the Whig nominee, Zachary Taylor (1784-1850) was chosen president, a brave soldier but vain and untrained in statecraft. The year 1850 is famous for the Compromise Measures, known as the 'Compromise of 1850.' Henry Clay, one of the distinguished statesmen of the period, led this movement for the preservation of the Union. One of the most important measures passed was a Fugitive Slave Law. Clay, Webster, and John Calhoun, all three disappointed presidential candidates, now old men, took part in the discussion to allay the conflict between the North and the South which was inevitably approaching. The Fugitive Slave Law provided that runaway slaves found in the free states could be recovered, and made other slave regulations, Webster going over to the pro-slave party. Taylor's death in 1850 made Millard Fillmore president (1800-74), a Whig and a strong party man. In early life a lawyer, he had always been a keen politician. The period is marked chiefly by an apparent cessation of party differences, which were so soon to blaze up in a different form into civil war. In 1853 Franklin Pierce (1804-69), a Democrat, became president, a man of pleasing manners but otherwise colourless. He was a supporter of slavery, and during his term of office feeling on the slave question began to run high. In 1857 he was succeeded by James Buchanan (1791-1868), another Democrat and pro-slave enthusiast. The year 1857 saw a legal decision of great importance on the slavery question. This was the Dred Scott case. The judges decided that it was legal for slave owners to carry their slaves into non-slave states, and in effect tore up the Missouri compromise. Anti-slavery feeling was growing rapidly. At this time there were in the U. S. 4,000,000 negro slaves. In 1859 John Brown, an anti-slavery fanatic, made a raid into Virginia and seized a government arsenal. He was hanged by the



4. JAMES MADISON (1809-17).
Republican.



5. JAMES MONROE (1817-25).
Republican.



6. JOHN QUINCY ADAMS (1825-29).
Republican.



7. ANDREW JACKSON (1829-37).
Democrat.



8. MARTIN VAN BUREN (1837-41).
Democrat.



9. WILLIAM HENRY HARRISON (1841).
Whig.



10. JOHN TYLER (1841-45).
Democrat.



11. JAMES KNOX POLK (1845-49).
Democrat.



12. ZACHARY TAYLOR (1849-50).
Whig.



13. MILLARD FILLMORE (1850-53).
Whig.



14. FRANKLIN PIERCE (1853-57).
Democrat.



15. JAMES BUCHANAN (1857-61).
Democrat.

government, but his action had alarmed the slave-owners. In 1861 Abraham Lincoln (1809-65), a Republican and strenuous opponent of slavery, was elected president on a minority popular vote. Brought up in the 'backwoods,' self educated, homely, he was a man of strong ethical sense and sterling qualities of mind: to-day he is generally regarded as the most characteristic product of the American democracy. On his election; the southern states seceded from the Union, with Jefferson Davis (1808-89) as president, the questions deciding them on this step being slavery and self-government. The N. determined to resist, and the Civil War (1861-65) was begun by the S. at Fort Sumter. The two sides were divided by a line roughly corresponding to the thirty-seventh degree of latitude. The battles of the war were many and bloody. Antietam (Sept. 1862) and Gettysburg (July 1863) were the scenes of terrible carnage. In both of these the Federal (Northern) states were successful. In 1863 Lincoln issued his famous Emancipation Proclamation, which liberated many slaves, and in the same year Grant captured Vicksburg. The year 1864 is chiefly notable for Sherman's march from Chattanooga through Georgia to the sea, with his army singing 'John Brown's Body' for a marching tune. The same year, the Confederate (Southern) ship *Alabama* which had been fitted out in England—a neglect for which England had to pay £3,250,000 damages after the war—was sunk by the Federal *Kearley* in a seventy minutes' combat. In 1865 was fought the battle of the Five Forks, in which the Confederates under Lee were utterly defeated by Sheridan. The war was practically ended by the surrender of Lee at Appomattox on April 9, 1865. Before the amnesty was signed, however, Lincoln was assassinated. Jefferson Davis fled, but was recaptured and kept in nominal confinement.

(5) *Modern America.*—Lincoln's successor in 1865 was Andrew Johnson (1808-75). The war left the U. S. impoverished, and beset by many political difficulties. Johnson, moreover, was not a success. He had little sense of dignity and quarrelled with Congress. An attempt to impeach him in 1868 only failed by one vote. But he possessed a certain amount of honesty and tact, and did do something to reconcile the sullen southern states to the Union. In 1867 Alaska was purchased by the U. S. from Russia. In 1869 Ulysses Simpson Grant (1822-85) was made eighteenth president, being also a Republican. The dominant political party made

strenuous and, on the whole, very successful attempts to deal with the financial situation. By an amendment to the Constitution in 1870, negroes were given equal rights with white men. . . .
evident to pay . . .
states . . .

of the damage to the negroes. Grant, who was the most able general during the war, and is one of the national heroes, was not so successful in the presidency. During his administration the greedy office-seekers and plunderers exerted great influence over him, and political morality reached a low ebb owing to the power of the Republican caucus. In 1877 Rutherford Birchard Hayes, a Republican (1822-93), became president. The years of his presidency were politically barren. The Republicans had become hopelessly corrupted, while the Democrats were divided against themselves. Besides which, the old crises were beginning to become stale, and fresh issues were only just coming to the fore. These were, however, years of commercial expansion and prosperity. In 1881 James Abram Garfield (1831-81), a Republican, was elected president, but was shot dead shortly afterwards. His place was taken by Chester Alan Arthur (1830-86), the vice-president. In 1882 a reform of the tariff was discussed, and continued to be the chief topic of debate till 1884, when the presidential elections resulted in the overthrow of the Republicans and the election of Cleveland (1837-1908), a Democrat. The victory of the Democrats was largely on the tariff question, the majority of the people being desirous of a reduction. This did not mean a break-up of the old party lines, but it did mean a change of issues in the fight between the parties. Like so many of his predecessors, Grover Cleveland was a lawyer in early life and had held several official positions. His administration was marked by great prosperity, and by a free use of the veto power by the president. An extensive reform of the Civil Service was carried out, resulting in a cleaner and more efficient public service. In 1889 Cleveland was defeated by Harrison, the Republican candidate (1833-1901), the grandson of the ninth president. He had fought for the Union army in the Civil War, and had been in the senate.
on the tariff
ho McKinley
The unpopularity of this measure led to the downfall of the Republican party in 1893 and Cleveland was elected to a

second term of office. During Harrison's tenure of the presidency, N. and S. Dakota, Montana, and Washington were admitted to the Union (1889), and Idaho and Wyoming in the following year. Cleveland's second period of office was marked by silver legislation (1893), by the settlement by arbitration of a dispute with England over the Venezuelan boundary, and by a slight reduction of the McKinley tariff embodied in the Wilson Bill. In 1897 William McKinley, the Republican candidate (1843-1901), was chosen as president. He, too, had fought in the Civil War, and had consistently advocated a high tariff policy. The Dingley Bill (1897) provided for high protection for U. S. industries. The attention of the U. S. was drawn in 1898 to the misgovernment of Cuba, which was in a state of anarchy, owing to the inefficiency of Spain, to whom it belonged. In order to end this state of affairs, the U. S. battleship *Maine* was sent to Havana, where it was blown up mysteriously. The U. S. attributed this to the Spanish government, and declared war. Spanish fleets were destroyed at Manila and Santiago, and in 1898 the peace of Paris gave Cuba its independence and handed the Philippines and Porto Rico over to the U. S., who in the same year annexed Hawaii. A revolt in the Philippines in 1899 was suppressed. In 1901 McKinley was re-elected president, but was assassinated the same year. He was succeeded by Theodore Roosevelt (b. 1858), of course also a Republican, a man of enormous activity and energy. In 1901 the Hay-Pauncefote treaty with Great Britain regulated the relations of the two countries with regard to the Isthmian Canal. In 1902 the U. S. bought for £8,000,000 rights over the Panama Canal, and in 1904 bought from Panama a strip of land on each side of the canal (see PANAMA CANAL). In 1905 Roosevelt was re-elected by the largest popular vote at that time on record. The years 1906-8 are marked by attacks by the president on the power of the trusts at home, and by the policy of the 'big stick' in foreign relations. In 1909 W. H. Taft (b. 1857) was elected on a Rooseveltian programme of anti-trust legislation and promises of a reduced tariff. In 1910-11 attempts were made at a Reciprocity of Duties Treaty with Canada, so as to establish freer trade between the two countries. The Canadian general election of 1911 gave an emphatic negative to the proposal. In 1913 Woodrow Wilson (b. 1856) swept the country on a Democratic programme, having a clear majority over the two

Republican ex-presidents (Roosevelt and Taft) opposed to him. Wilson is a distinguished historian, and has been president of Princeton University. He is a unique figure among American presidents. His election was fought chiefly on the tariff question, his main argument being that some industries were receiving unfair protection at the expense of others.

American Literature.—It is said that the first book of note written on American soil is George Sandy's translation of Ovid (published 1626). But this, like so many of the early monuments of American literature, has little that is distinctive of the New World about it. There are in the early annals of American literature a great many sermons, pamphlets, and letters, but these claim attention rather from an historical than a literary point of view. Roger Williams's *Bloudy Tenent of Persecution* (1644) was one of the earliest pleas for all-round religious toleration. Anne Bradstreet's poems and Wigglesworth's poem, *The Day of Doom* (1662), are also worthy of mention. But with the 18th century American literature begins to strike a more distinctive note. Two great Puritan divines are notable in the early part of the century. The first is Cotton Mather (1663-1728), whose learned and able, if somewhat ill-arranged *Magnalia Christi Americana* (1702) is of great historical and theological importance. The other is Jonathan Edwards (1702-58), whose exposition of the Calvinistic conception of the universe (in the *Freedom of the Will*, 1751, and the *Treatise on Original Sin*, 1758) is the ablest setting forth of that system of theology. Benjamin Franklin's (1706-90) works are notable as the expression of a manly and vigorous personality. His *Autobiography* (published 1817) is plain-spoken and self-revealing to an unusual but not to an excessive extent. His style is a model of plain yet forcible prose. He also wrote largely on contemporary politics. Political writing was, indeed, the kind most practised in the middle and later years of the century. Jefferson's *Declaration* (see above), *The Federalist* (1788), the speeches and pamphlets of Washington and others, come under this heading. John Woolman's *Journal* is one of the finest Quaker books, and has received high praise from the pens of Lamb and others. A very naïve and refreshing book, praised by Hazlitt and Lamb, is St. John de Crevecoeur's *Letters of an American Farmer* (1782), which describes simple personal emotions and



16. ABRAHAM LINCOLN (1861-65).
Republican.



17. ANDREW JOHNSON (1865-69).
Republican.



18. ULYSSES SIMPSON GRANT
(1869-77). Republican.



19. RUTHERFORD BIRCHARD HAYES
(1877-81). Republican.



20. JAMES ABRAM GARFIELD (1881). 21. CHESTER ALAN ARTHUR (1881-85).
Republican.





22 and 24. GROVER CLEVELAND
(1885-89 and 1893-97). Democrat.



23. BENJAMIN HARRISON (1889-93).
Republican.



25. WILLIAM MCKINLEY (1897-1901). 26. THEODORE ROOSEVELT (1901-9).
Republican. Republican.



27. WILLIAM HOWARD TAFT (1909-13)
Republican.



28. WOODROW WILSON (1913).
Democrat.

life and customs in the colonies. Webster's speeches are wonderful efforts of oratory (for incidents in his life see above); but, like all oratory, suffer somewhat unless we are familiar with their occasion. Freedom, however, has seldom had a more eloquent tongue to sound her praises. Lincoln's speeches and letters are also among the classics. One of the greatest names in American belles lettres is that of Washington Irving (1783-1859). His first great success was his *History of New York* (1809), written in vein of wholly delightful humour. His *Sketch Book* (1819) included 'Rip Van Winkle,' perhaps the most widely read of his writings. *Bracebridge Hall* followed, and then came several historical works dealing chiefly with Spain. His later works are not up to the level of those earlier ones. His style is well-knit, and has great variety of movement. He has the highest powers of sympathetic humour, rhetorical grace, and vivid description. Gifts of quite another kind were bestowed upon Fenimore Cooper (1789-1851). He had passed a part of his boyhood among the Red Indians, and what he had seen had sunk deeply into his mind. This served as the inspiration for the novels which have been the delight of generation after generation of schoolboys of all ages. Among them may be named *The Last of the Mohicans* (1826), *The Pathfinder* (1840), and *The Deerslayer* (1841). Though his writing is unequal, both as between his different books and within the limits of a single book, he was possessed of the highest narrative gifts. His style possessed the highest gift of all—that of being unnoticed by the reader. He never gets between the reader and his meaning. Like Scott, Cooper had many imitators. William Cullen Bryant (1794-1878) was one of the earliest of America's poets. Trained to admire the school of Pope, he soon, like Wordsworth, saw that a new departure in poetry was necessary. The poetry of his mature years is distinctively American in its subject-matter, and individual in its treatment. He had fine descriptive powers, and could with unerring eye detect the outstanding features of a landscape and reproduce them in verso. His patriotic verse shows a sincere belief in the value of freedom. He never fully realised the promise he gave in *Thanatopsis*, his finest and best-known poem, though the fact is generally lost sight of that the poem as it now stands includes a number of changes that were made in later years. His translation of the *Iliad* appeared in 1870, that of the *Odyssey* in 1871-

72. Edgar Allan Poe (1809-49) is famous both as poet and writer of short stories. His tales include *The MS. found in a Bottle*, *The Fall of the House of Usher*, and *Tales of the Grotesque and Arabesque*. These are the products of a prodigal imagination running riot over the fields of the marvellous. They are unequalled for weird and powerful effect. His poems—the best known of which are: *The Raven*, *Ulalume*, *The Bells*, and *Annabel Lee*—are distinguished by great charm of melody, real power of lyric expression, and a perfect command of lyric form. Poe's influence on modern French literature has been considerable. The best known abroad of America's poets is H. W. Longfellow (1807-82). Educated at Bowdoin College, he was appointed in 1836 Smith professor. He taught for many years, but this aspect of his work speedily became subordinated to his work as a poet. Among his *Voices of the Sea* (1847; *Golden Hiawatha*) appeared, and in 1855 *The Courtship of Miles Standish*. *Tales of a Wayside Inn* were published in 1863 and in 1867-70 a translation of Dante. The volumes named contain his best work. Longfellow's poetry has been accused, like Tennyson's, of a want of intellectual force, but this probably arises from the very familiarity which it has acquired on both sides of the Atlantic. His work has much of Wordsworth's simplicity, and all his work is the expression of a grave, yet gentle and kindly personality. He had a very considerable command of metre, and his metrical effects are often both striking and agreeable. His popularity is attested by the frequency with which some of his typical poems, such as *The Psalm of Life*, *The Village Blacksmith*, etc., are quoted by the common people. Hardly inferior to his works are the poems of J. G. Whittier (1807-92), the Quaker poet. In early life a journalist of the anti-slavery party, he wrote a very large number of poems on the subject of slavery and the war, though his Quaker principles forbade him to participate in the fight. His early volumes include *Lays of My Home*, 1843; *Songs of Labour*, 1850; *The Panorama*, 1856. His great success came with *Snowbound* (1866). In 1867 he issued *The Tent on the Beach*. His last volume was called *At Sundown*. *Snowbound* is his masterpiece, unexcelled for descriptive vividness and felicity of phrase. A true and tender poet, he lives in the hearts of those who care for sincerity and strength, combined with a strong

religious sentiment. Longfellow was succeeded as professor at Harvard by J. R. Lowell (1819-91). Lowell had early dedicated himself to poetry, and in 1841 published *A Year's Life*. In 1848 came *The Vision of Sir Launfal*, and in the same year appeared *The Biglow Papers*. The latter were a powerful satire on the Mexican War, and did much to shape public opinion. A second series of *Biglow Papers* appeared later in order to satirise the Civil War. His other poetical works include a *Commemoration Ode* (1865), *Under the Willows* (1869), *The Cathedral* (1870), *Heart's-ease and Rue* (1888). His poetry is distinguished by a strong reforming and ethical bias and a sincere directness of expression. His early verse often contains quaint plays of poetical fancy, and he was never afraid of using comic effects in verse. Nearly all his poems reflect a true and intimate knowledge of nature. Lowell is also an essayist of great distinction. His best-known volumes are: *My Study Windows* and *Essays on the English Poets*. His prose is always eminently clear and readable, and his literary essays, though sometimes perverse in their judgments, are stimulating and suggestive. Another writer of both verse and prose is O. W. Holmes (1809-94). He was early attracted to literature, and when twenty wrote the poem *Old Ironsides*. The works of Holmes most widely read to-day are the *Breakfast Table* series of essays, *The Autocrat*, *The Professor*, and *The Poet*. He also wrote some novels, and many poems are included in the volumes of essays. His essays have a lively and unflagging humour, powers of keen satire—particularly satire on the Calvinists—tenderness, and grace. His poems have a graceful charm which is all their own, the best-known being *The Chambered Nautilus*, and the ever-delightful *Deacon's Masterpiece or the Wonderful 'One Hoss' Shay'*. The lofty and original genius of R. W. Emerson (1803-82) has been a powerful force in the history of 19th century thought and literature. In early life a school-master and a Unitarian minister, he left the Unitarian body, owing to religious differences. His first publication of note was *Nature* (1836), which was not well received by the public, but the value of which was clearly seen by Carlyle. For the rest of his life he lived mainly by his lecturing and later by his books. His chief works are: *Essays* (two series); *Representative Men*; *English Traits*; *The Conduct of Life*; *Society and Solitude*, and a volume of poems. His transcendental philosophy is ex-

pressed in a style at once illuminating, arresting, vivid and impassioned. There are few who are not stimulated by reading him. His message to the ages is expressed in all his work, but is to be found practically complete in the essays on *Nature*, *Self-Reliance*, and *Compensation*. For him, 'The Universe is the externisation of the soul,' and 'America is a poem in our eyes: its ample geography dazzles the imagination, and it will not wait long for metres.' Working rather by the suddenly illuminating lightning flash which reveals the falsities of the world than by logical argument, he has gained recognition as a thinker and prophet wherever English is spoken. His poetry, which falls below the level of his prose, is marked by intellectual power rather than true poetical expression. His nature poems, such as *Woodnotes*, give a faithful and charming rendering of certain aspects of country life. Emerson's friend, H. D. Thoreau (1817-62), ranks inferior only to Emerson as a transcendental writer and thinker. A fine scholar, and possessed of a note characteristic of the New World, his fame is still growing among the Anglo-Saxon races. His greatest and best known work is *Walden, or Life in the Woods* (1854), but he also wrote other volumes of description and essays (*A Week on the Concord*; *Miscellanies*, etc.). Thoreau is one of the most individual writers in the world. His works reflect the man—they are full of whimsicality, eccentricity, felicitous description, sudden excursions into philosophical ground, and are pervaded like Emerson's with a strong ethical sense. His style is similarly varied—it can be plain or ornate, straightforward or epigrammatic, grave and studied, or light and whimsical. Though he never made form his chief study, his form will be found invariably the most suited to his matter. John Burroughs (b. 1837) may be mentioned with Emerson and Thoreau. His three great inspirations have been Emerson, Walt Whitman, and Matthew Arnold, the first awakening his religious nature, the second stirring him by his humanity, the third teaching the necessity of clear expression. Burroughs' first book was *Walt Whitman as Poet and Person* (1867). He also wrote tributes to Emerson and Thoreau. Burroughs is more significant as a naturalist, and his many books dealing with nature and animal life are full of original and illuminating observation, and are further distinguished by simplicity of style. The most revolutionary figure in American literature is Walt Whit-

man (1819-92), who started his literary career as a novelist. It was not till 1855 that his first really great book *Leaves of Grass* appeared. His later poems include *Drum-Taps*, a record of his work as a nurse in the Civil War. He wrote in prose *Specimen Days in America* and *Democratic Vistas*. Whitman has been called 'the first democrat,' and there is something to be said for this. What seems like brag in his work is often merely a sense of his dignity, as the mouthpiece of democracy. His verse is unrhymed and unmetrical in the ordinary sense of 'metre,' but it has a swinging energy and abounds in happy phrases. That his neglect of rhyme and the ordinary rhythms was not due to inability to write ordinary verse is proved by his noble poem on the death of Lincoln, *O Captain! My Captain!* Other poets of America are Bayard Taylor (1825-78), who in addition to many fine lyrics made a wonderful translation of Goethe's *Faust*; C. G. Leland (1824-1903), translator of Heine and author of *Hans Breitmann's Ballads*; Sidney Lanier, E. R. Sill, Richard Hovey, T. B. Aldrich, E. C. Stedman, R. W. Gilder, and J. B. Tabb. Among contemporary poets one might mention J. W. Riley, Bliss Carman, and Joaquin Miller (*Songs of the Sierras*). If the songs of a nation are to be included in its literary heritage then one must take account of John Howard Payne (1791-1852), author of *Home, Sweet Home*, and Julia Ward Howe (1819-1910), author of the stirring *Battle Hymn of the Republic*, which was composed at the beginning of the Civil War.

Among the really great novelists one must consider Nathaniel Hawthorne (1804-64). Recognition as a novelist did not come to him soon, and his stories were written as interludes in a busy diplomatic career. His greatest works are: *The Scarlet Letter*, *The House of the Seven Gables*, and *The Marble Faun*, together with his stories for children, *The Wonderbook* and *Tanglewood Tales*. His works exhibit the finest talent for story-telling. He has

for form and for the and is thus in a sense classical, his works being to this extent greatly in advance of his English contemporaries. But his prevailing temper is romantic, not in the sense in which Scott's is romantic, but in his power to feel the glory and beauty of the New England past, without adding a meretricious glamour by the aid of external trappings. Though Harriet Beecher Stowe (1811-96) wrote many novels, she is best known by *Uncle Tom's Cabin* (1851-52). A well-told,

realistic and dramatic narrative, it owes its large fame chiefly to its being a portrayal of certain scenes and conditions in connection with problems which then agitated the N. and S. Later great American novelists are Bret Harte (1839-1902), who, while painting the Far West in no flattering colours, has shown that rough externals may conceal real greatness of soul, and his fellow-humorist 'Mark Twain' (S. L. Clemens), whose laughter has in it the philosophy of a keen observer of life, and is quite free from vulgarity and offence. Henry James (b. 1843) is one of the greatest novelists of the second half of the century. He has carried the psychological analysis of human motives to its fullest development in fiction. His style is quite individual, but is admirably suited to his purpose, and while often eloquent and ornate it is never merely grandiose. A distinguished disciple of his method is Mrs. Edith Wharton (b. 1862), who, if somewhat less subtle in her power of suggestion, is correspondingly more simple in style. William Dean Howells (b. 1837) is the founder and head of the realistic school, paying scrupulous attention to detail and deriving something of its method from the Russians. Mary E. Wilkins (Mrs. C. M. Freeman) is an important member of this group. Her stories deal with the commonplaces of New England life, and are astonishingly well written. Frank Norris (1870-1902), who lived to complete only two books of his projected trilogy of the 'epic of the wheat,' is the most significant of 'sociological' novelists. He has sometimes been compared to Zola, while David Graham Phillips (1867-1911), owing to his comprehensive outlook on American life, has been called the 'American Balzac.' Thomas Nelson Page is the author of some striking stories of Southern life. Weir Mitchell and Mary Johnston are historical novelists of note, writing on American subjects, while Francis Marion Crawford (1854-1909) concerns himself with foreign history. His

author of other stories, was a master of the humorous narrative and whimsical incident. A type in which Americans have been conspicuously successful from the first is the short story. Irving, Hawthorne, Poe, Harte, James, Mrs. Wharton, are masters of international reputation in this medium. Edward Everett Hale (1822-1909) is famous for a single short story, *A Man Without a Country*. A new school of short-story writers has

developed in recent years. The founder of this school is 'O. Henry' (William Sydney Porter) (1867-1910), who in *The Four Million* and other books, wrote of the life of the people, and employed the American idiom with much original power. Probably no author is more popular. Coincidentally, a new school of humour has risen in the writings of F. P. Dunne, creator of the sagacious *Mr. Dooley*, and George Ade, author of *Fables in Slang*. Earlier humorists aside from 'Mark Twain' are Charles F. Browne ('Artemus Ward') (1834-67), Henry W. Shaw ('Josh Billings') (1818-85), Joel Chandler Harris (1848-1908), the author of *Uncle Remus' Stories*, amusing dialect fantasies. In the summary of American literature one can hardly omit the names of Sarah Margaret Fuller ('Ossoli') (1810-50), R. H. Dana (1815-82), author of *Two Years Before the Mast*, and Donald G. Mitchell (1822-1902), author of *Reveries of a Bachelor and Dream Life*.

Of great American historians three may be grouped here. W. H. Prescott (1796-1859) is the first of these. In spite of the loss of one eye he worked with great courage, and early turned his attention to historical study. His first great work was *The History of Ferdinand and Isabella* (1836), a monumental work displaying enormous reading and research. In 1843 appeared the *History of the Conquest of Mexico*, and in 1847 his greatest work, *The Conquest of Peru*. In spite of the enormous erudition which went to the compilation of his volumes, Prescott is never dull. He does not stop to philosophise, but tells his tale simply and well. He is one of the first and one of the most readable of modern scientific historians. The second is Francis Parkman, who also early in life decided to be an historian. His first and perhaps his greatest historical work was *The Conspiracy of Pontiac* (1851), a stirring story vividly told. In a series of volumes (*The Pioneers of France in the New World*, 1865; *The Jesuits in North America*, 1867; *The Old Régime in Canada*, 1874; *Count Frontenac and New France*, 1877; *Montcalm and Wolfe*, 1884) he treated of the history of the French and English in America. He had brilliant powers of description and his narrative never flags for a moment. J. L. Motley (1814-77), shared Prescott's and Parkman's gifts of vivid and picturesque description. He started as an historical novelist, but turned to history proper, and about 1845 conceived the plan of writing a history of the Dutch. The outcome of this was his world-

famous *Rise of the Dutch Republic* (1856), which was followed by *The United Netherlands* (1860-68). For vigour and earnestness, pictorial imagination and rhetorical power, he is unexcelled among historians. Among other historians there is George Bancroft (1800-91), whose voluminous *History of the United States, from the Discovery of America to the Inauguration of Washington* (1834-85), though old-fashioned now in its style and thought, had exercised considerable influence in the generation in which it was published, espousing as it did a strong democratic ideal. Recent and contemporary historians and essayists deserving of mention are T. W. Higginson, John Fiske, C. E. Norton, and William James.

The fine arts: painting, sculpture, and music.—The first American painters, Benjamin West (1738-1820), John Singleton Copley (1735-1815), Charles Wilson Peale (1741-1827), and Gilbert Stuart (1755-1828), followed British traditions. Later painters, Washington Allston (1779-1843) and John Vanderlyn (1776-1852), were influenced by the Italians. The year 1825 saw the beginning of a native movement in art. This was the Hudson River School, started by Thomas Cole. Landscape was its favourite theme. In the fifties the influence of Düsseldorf and Munich was evident. During the last half century France has been the dominating factor in the art of America, as in the art of other countries. William Morris Hunt (1824-79) and John La Farge (1835-1910) were the artistic missionaries who visited France and brought over with them the principles of the Barbizon painters. George Inness (1825-87), who also visited France, was the first American painter to put them into practice. Inness was the first great native landscape painter. Since Inness, America has been particularly strong in this branch of the art, and among the brilliant landscape painters may be mentioned the names of Alexander H. Wyant, Homer D. Martin, Dwight W. Tryon, Theodore Robinson, Childe Hassam, and John Twachtman. The last three belong to the Impressionist school. Twachtman, who died in 1902, was a painter of great poetic refinement, probably the finest landscape painter America has produced. Winslow Homer (1834-1910) is generally acknowledged to be the most American in his art. His paintings of the sea are distinguished for their vigour and character rather than for their facile technique. Among artists of international reputation who have worked mostly abroad

arc James McNeill Whistler (1834-1903), who influenced by Velasquez and the Japanese, is known as the creator of portrait 'arrangements,' colour 'symphonies,' and 'nocturnes'; E. A. Abbey (1852-1911), known for his exquisite pen drawings, illustrations to Shakespeare, and panel decorations in colours; Mary Cassatt, who belongs to the Impressionist school, and has painted very charming studies of mothers and children; John S. Sargent (b. 1856), the most prominent portrait painter of the day. Other painters worth mentioning are: George Fuller (1822-84), W. M. Chase, Charles W. Hawthorne, and A. P. Ryder. The last-named is a painter of rare Poe-like imagination, and his 'moonlights' show beautiful if weird effects. The so-called New York school includes some of the best painters of the day, Robert Henri, George Luks, John Sloan, William Glackens, George Bellows, all realists and following more or less democratic traditions. Edward Redfield heads a vigorous landscape school in Pennsylvania. A. B. Davies, John Marin (water-colourist), and Maurice Prendergast are among those who follow the more modern tendencies.

Until the Centennial Exposition in 1876, the classic influence reigned supreme in sculpture. Houdon's visit in 1785 had no great influence. The first sculptors followed Canova. Not until Henry K. Brown (1814-86) and his pupil, J. Q. A. Ward (1830-1910), did any sculptor show a spark of national feeling. Ward found inspiration in the figures of Indians and negroes. America's most famous sculptor is Augustus Saint Gaudens (1848-1907), whose statues have an austere beauty, and are modern, though tempered somewhat with classic feeling. There was a sense of dignified restraint in all he did. His pupil, Frederick MacMonnies (b. 1863) shows a more decided French influence. His sculpture is modern, realistic, and shows a more agitated feeling. Other prominent sculptors are W. O. Partridge, Herbert Adams, Paul Bartlett, Karl Bitter, Lorado Taft, Solon H. Borglum, George G. Barnard, and Charles Gruffy. Rodin has been the great influence among the younger men, but there are others who prefer to treat native subjects in a bluntly realistic manner.

Music, as a creative art, is of comparatively recent growth in the U. S. Among the earlier men Louis Moreau Gottschalk (1829-69), composer of Creole music, has a European reputation. Edward A. MacDowell (1861-1908), creator of symphonies, concertos, sonatas, and songs, is the

greatest musician America has produced. The *Indian Suite*, based on the folk music of the Sioux Indians, is his best-known composition. Other composers of note are George W. Chadwick, Frederick S. Converse,

Rubin Gold-
Victor Her-
re authors

of many popular operas and songs.

Inventions, industrial achievements, etc.—The invention of the cotton gin in 1793 revolutionised the cotton industry. In 1807 Robert Fulton's *Clermont*, tried on the Hudson, proved to be the first successful experiment in steam navigation. In 1837 Samuel F. B. Morse exhibited the telegraph. In 1841 Richard M. Hoe brought out the rotary press for printing newspapers. In 1844 the first telegraph was set up between Baltimore and Washington. In 1845 Elias Howe invented the sewing machine. The first trans-Atlantic cable, establishing communication between the U. S. and England, was laid in 1858. The Remington typewriter, shown in 1873, was invented by C. L. Sholes in 1868. In 1868 George Westinghouse devised the air-brake now employed on all railroads. In 1876 Alexander Graham Bell secured letters patent for his telephone. In 1877 Thomas Edison invented the phonograph; in 1879 the incandescent light; in 1887 the Pyro-magnetic dynamo, and in 1893 the kinetoscope, which was the original form of the cinematograph. Wireless between U. S. and England was established in 1903. The first railroad tunnels under the Hudson, connecting New Jersey and Manhattan Island, were opened in 1908. By far the most important undertaking in recent years has been the Panama Canal (q.v.).

Architecture.—Commercial conditions have evolved during the eighties the 'skyscraper,' a structure whose skeleton of steel, before completion, has the appearance of a huge cage. These buildings are being built taller and taller. In the New York City four-story skyscraper surely deserves the name of 'American architecture.' Various efforts have been made to beautify the skyscraper.

Education is universal and compulsory in the elementary stages, and ranges from the kindergarten to the university. 77 per cent of the total population over ten years are illiterate, but this is due largely to the enormous stream of emigrants, illiteracy rising to 12.7 per cent. in the case of foreign born whites, and to

past neglect of negroes, 30·4 per cent. of whom are illiterate. The control of education is exercised by the state and local authorities in conjunction. Elementary education is imposed on all between six and fourteen years of age, and is the most democratic in the world. The public elementary schools are maintained by local taxation. There are also numerous secondary or high schools giving further instruction. Some institutions described as universities correspond rather to the English high schools. Many of these receive state grants, and most are run on the basis of co-education. University education in the U. S. is well provided for. There are some five hundred universities and university colleges, and numerous professional and technological institutions, embracing in all some 300,000 students of both sexes, and about 28,000 professors and other instructors. American scholars are well to the forefront in all branches of knowledge, especially in such subjects as English language and literature, psychology, education, and the various technical studies.

Federal Constitution and State governments.—For details as to the history of the Constitution, *see above*. There are three main factors in the U. S. government—the Executive, the Legislature, and the Judicial Authority. The president possesses the executive power, and is elected every fourth year by electors chosen by each state to a number equal to the number of senators and representatives for that state, no senator or representative being eligible as an elector. Voting is by ballot. Should the result not give a clear majority to any candidate, the House of Representatives chooses from among the top three candidates. In the event of the president's death, the vice-president acts as president till the next election. Provision is also made for a president in the event of the death of a vice-president who has succeeded to the presidency. The legislature consists of two houses—a Senate, elected for six years, and a House of Representatives for two. The president has a veto power, which can be overridden by a two-thirds vote of each house. The senators are chosen by the state legislatures, the representatives by popular vote. The judicial power rests with a chief justice and eight justices, who are appointed by the president. In addition each state has a legislature, with varying conditions as to election of senators and representatives, but in all cases consisting of two houses and a governor appointed for from two to four years.

Army and navy.—The U. S. army, which is recruited on a voluntary

basis, must not exceed 100,000. Its present strength (1913) is about 4500 officers and 80,000 men. In addition there are the various state militias, amounting in all to over 100,000 men. The navy is efficient and well-manned. There are at present (1913) in service or under construction 38 first-class battleships, 12 armoured cruisers, 22 protected cruisers, 13 gunboats, 49 submarine torpedo boats, 56 destroyers, and various others, amounting in all to 399 vessels. The U. S. total expenditure on armaments for 1912-13 is 216,607,213 dollars.

Weights and Measures.—Same as those of the United Kingdom, with a few unimportant exceptions. The metric system is legal, but generally unused. The currency is based on a metric scale, the unit being the dollar (=100 cents.), which is nearly 4s. 1½d. English.

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Units are standards, arbitrarily chosen, in terms of which quantities may be expressed. Scientifically, U. are of two kinds, viz., fundamental and derived. The fundamental U. are those in terms of which all others can be expressed. The units of length, time, and mass are accepted as fundamental and all other U. can be derived from these. The English system of dynamical U. is called the foot-pound-second system, since the U. of length, mass, and time are the foot, the pound, and the second respectively. In this system the U. of area or of surface is a square foot, i.e.

a square whose length and breadth is 1 ft. For measurements of volume, the U. is a cubic foot. The Us. of area and of volume are in two and three dimensions respectively. The adopted scientific system is the C.G.S. system, or the centimetre-gram-second system. This system, having the U. suggested by its designation, is advantageous in that each U. is exactly ten times the next smaller U. of the same kind and hence in changing Us. there is no tedious arithmetic involved. Also the Us. of length, mass, and time are conveniently related, since the mass of a certain known volume of water can quickly be obtained, 1 gram being the mass of 1 cubic centimetre of water at 4° C. Us. of force, work, and velocity, etc., involve two or all of the fundamental U. in their definition. Thus the U. of velocity is that velocity with which a point passes over U. distance in U. time (i.e., 1 cm. per sec. or 1 ft. per sec. according to the system of U., C.G.S. or F.P.S.). Two systems of electrical Us. are derived from the C.G.S. system, viz., the electro-static and the electro-magnetic. For the definitions of the various U. see ELECTRICITY, MAGNETISM, FORCE, WATT, AMPERE, OHM, VOLT, VELOCITY, etc. See also Everett, *Units and Physical Constants*, 1891.

Univalves (Lat. *unus*, one; *valva*, valve), a division of molluscs formed on account of the shell consisting of a single piece. All gastropods are U.

Universal, the abstract conception which is drawn from a multitude of objects of the same class, and which embodies the features common to all. Thus *man* in the abstract is a universal term, while an individual man is the particular. It is thus equivalent in some way to the Platonic 'Idea.' For the great mediæval controversy as to the real existence of Us., see NOMINALISM.

Universalists, primarily those who hold the opinion first definitely upheld by Origen, that all men and even the devils themselves will finally be saved. This opinion, or a modified form of it which said that all men would be saved, was common in the early centuries and is not uncommon to-day. The name U. is also given to a sect founded in 1774 in America by John Murray. A later important member of the sect was Hosea Ballou, whose advanced Unitarian beliefs have now been widely accepted among all Universalist churches. See Farrar, *Eternal Hope*, and Eddy, *Universalism in America*, 1884-86.

Universal Language. At most periods in the world's history some one language has naturally tended to assume the position of a U. L. Greek

did so at the time of Christ, in the middle ages Latin was everywhere spoken by the learned, while at the present time English and French may be said to share the position. It has been the dream of many, however, to construct an artificial language which shall either supplant national tongues or act as their auxiliary. In 1879 appeared Volapuk, which owed its origin to Johann Martin Schleich. More famous in our own day is Esperanto, invented by Dr. Zamenhof.

Universal Time, a system of reckoning time to be uniformly used throughout the civilised world for international purposes. Its use was agreed upon at the International Conference at Washington in 1883. By it the day is considered as one of twenty-four hours. The circumference of the earth is divided into twenty-four parts of 15° each, and a local time is fixed for each, in which all odd minutes and seconds are ignored. Thus the local times differ from the U. T. only by even hours.

Universe, a term generally used as the word world once was, to signify the collection of all created things. By the technical term *theory of the universe* is understood what is known of the general arrangement of planets, stars, etc., and of their connection with one another.

Universities are corporations, either lay or clerical, which have since the 12th century had the charge of educating the members of the learned professions throughout Europe and the colonies founded by European states. In its earliest uses the term *universitas* was not confined to scientific bodies, but was used in a general sense equivalent to our modern word corporation. This was the Roman sense of the word, and it was long before it gained its present

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y catho-
dral and monastery of Europe there has, from a very early period, been attached a school in which were instructed all candidates for the priesthood and such laymen as could afford it. It appears from the letters of Abelard (d. 1142) and from other contemporary sources, that in Paris the poorer establishments entrusted the conduct of this school to one of their number called the Scholasticus, and that the wealthier bodies maintained a Scholasticus to instruct the junior pupils in grammar and philosophy, and a Theologus to instruct the more advanced in theology. About the time of Abelard large numbers of young men began to

move in the direction of Paris, and the reputation of Abelard himself did much to make the name of Paris everywhere famous. A more elaborate organisation became necessary, but the Parisian organisation is marked by being primarily in the hands of the teachers and doctors. At the head stood the rector, elected by the four faculties of theology, arts, law, and medicine. The members of the U. were divided into four nations, France, Picardy, English (later German), and Normandy. At an early period colleges were established within the U. of Paris by private families or religious orders. Originally they were intended exclusively for poor scholars, who were to live in them subject to a certain discipline. By degrees, as more numerous and able teachers were employed in these colleges, they assumed the character of boarding houses for all classes of students. The growth and organisation of the U. of Paris has here been dealt with in some detail as being the most famous example of that class of U. in which the government rested almost entirely with the teachers. Opposed to Paris in this respect was Bologna. Here all jurisdiction rested with the students, who elected their own governors. During the middle ages Paris was the home of scholasticism, Bologna was pre-eminent in the study of canon-law, and a third U., Salerno, was famous for its medical school. The growth of U. throughout Europe was rapid. Before the Reformation they were established in Italy, France, the German empire, Spain, Great Britain, and even among the Slavonic nations E. of the Germans. In all of these we recognise the leading features of Paris or Bologna. With the revival of learning, which came at the time of the Reformation, the old U. underwent some change and many new ones were founded. They almost entirely lost their clerical character, other sciences were added, and the power of the U. was gradually restricted. The spread of learning prevented its monopoly by close corporations, and the invention of printing co-operating with the extension of elementary and secondary schools did much to raise the standard of education among those classes which did not receive a U. education. In no way less considerable is the change which has passed over the U. of Europe during the past century. The general expansion of men's minds, due to the marvellous inventions of the time and the spread of civilisation, has made this necessary, while the most important single factor is the rapid advance made in the study of natural

science. For the various modern U. see separate articles on each.

University College, see LONDON.

University College, Oxford, dates from the year 1249, when William, Archdeacon of Durham, bequeathed a sum of money to maintain certain graduates of the university, the institution obtaining the name 'The Great Hall of the University,' which is still part of its designation. Later on, however, legend named King Alfred as the founder and assigned 872 as the date.

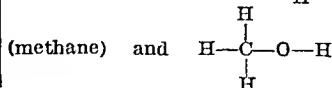
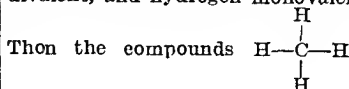
University Settlements, those houses found now in many of our large cities where a number of educated men and women live in order to improve by their influence the social and intellectual condition of the poorer parts. The scheme began among certain Oxford men, who in the early 'sixties began to spend their vacations together in Whitechapel and Stepney. The first regular establishment, Toynbee Hall (*q.v.*), was made in this district in 1884. Other settlements in London are Oxford House (Bethnal Green), Cambridge House, and the Women's University Settlement (Blackfriars Road). Such settlements are also seen in Glasgow and Edinburgh and in many American cities, where they are better known as social settlements.

Unleavened Bread is made of flour and water without the addition of yeast. It was ordered to be used among the Jews during the time of Passover, and from its supposed use by Jesus at the Last Supper was almost invariably used in the West for the Eucharist. Its use for this purpose is obligatory in the Roman Church, but is unknown throughout the East.

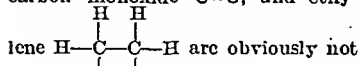
Unna, a tn. of Westphalia, Prussia, 10 m. N.E. of Dortmund. There are salt works, springs, and a bathing establishment, also coal mines and iron works. Pop. 17,381.

Unreason, Abbot of, see ABBOT OF UNREASON and FOOLS, FEAST OF.

Unsaturated Compounds. Organic compounds which contain carbon atoms that can combine directly with other atoms or groups are said to be unsaturated. This depends upon the view that the valency of atoms is fixed. Carbon is represented as quadrivalent, oxygen as divalent, and hydrogen monovalent.



(methyl alcohol) are saturated, but carbon monoxide $C=O$, and ethy-



saturated. In the graphic formulae of all such substances, the particular carbon atoms are represented as joined by a double bond or linking; thus ethylene $H^2=C=C=H^2$. Substances formed by the direct union of U. C. with other atoms are called 'additive products.' See VALENCY.

Unsoundness, see WARRANTY.

Unst, an island of the Shetlands, Scotland, 38 m. N.E. of Lerwick, with an extent of 29,850 acres. It is 12 m. long and its greatest width is $5\frac{1}{2}$ m. Balta and Uvea Sounds afford safe anchorage.

Unterwalden, a forest canton of Switzerland, lying to the S. of the Lake of Lucerne. It is divided into Obwalden (area 183 sq. m.) and Nidwalden (area 112 sq. m.). Pasturage and dairy work are the chief industries. It was one of the founders of the Confederacy. Total pop. 30,914.

Unwin, William Cawthorne (b. 1838), an engineer, born in Essex. He became instructor at the Royal School of Naval Architecture, 1868; professor at the Royal Indian Engineering College, 1872; and at the Central Technical College of the Guilds of London, 1884. He has served on numerous commissions and learned societies, and is the author of many valuable works.

Unyoro, a dist. of British E. Africa, lying N.W. of Uganda, between lakes Albert and Ibrahim. Area about 32,000 sq. m. Pop. (Wanyoros) unknown.

Upanishad, see VEDANTA.

Upas-tree, a species of *E. Indica*. See ANTIDIARIS.

Upernivik, or Upernavik, northernmost Danish settlement in Greenland, on an island off W. coast; lat. $70^{\circ} 48' N$.

Uphall, a par. and vill. of Linlithgowshire, Scotland, on Brox Burn, 5 m. S.E. of Linlithgow. Pop. (1911) 12,767.

Upolu, see SAMOA.

Uppingham, a market tn. in the co. of Rutland, England, with a fine church, St. Peter and St. Paul, and a public school of importance, which dates from the 16th century, and is capable of receiving between 400 and 500 scholars. Pop. (1901) 2588.

Upsala, the cap. of the län of Upsala, Sweden, on both sides of the R. Tyrils, 40 m. N.W. of Stockholm. The old town is on the W. bank and

the new on the E., the two being joined by five bridges. It is a town of great historical interest. Its university, with which Linnaeus was connected, was founded in 1477 and the new buildings were erected in 1879-86. In the Gothic cathedral (1230-1435) are buried Gustavus Adolphus and Linnaeus. Pop. 25,960.

Upton, a tn. of Woreestershire, England, on R. Severn, 0 m. N.W. of Tewkesbury, with trade in cider. Pop. of reg. dist. (1911) 6620.

Ur, called in the Bible 'Ur of the Chaldees,' an ancient city of S. Babylonia, at the meeting of the Euphrates, the canal Shat-el-Hai, and the Wady Rummelu; identified with modern Mugheir.

Uræmia, a toxic condition caused by insufficient excretion of urea. It may be brought about by kidney disease, or may be central nervous in origin, metabolism being disturbed through lack of the necessary stimuli to secretion. The presence of urea in the system brings about toxic effects; the nerve centres are poisoned and there is often a comatose or uncoordinated condition which often resembles drunkenness. Three varieties are recognised: acute, latent, and chronic. In acute cases bleeding by the application of leeches is productive of good effects. In chronic cases a regular course of Turkish baths is said to have the effect of stimulating excretion and so diminishing the excess of urea.

Ural, or Yaik, a riv. of Russia rising in U. Mts. in the govt. of Orenburg. It flows S. to Orsk; then N. to Orenburg and Uralsk, and again S. to the Caspian Sea, which it enters by many branches, forming a large delta. For many miles it is the boundary between Europe and Asia. Length 1335 m. It has large fisheries.

Uralite: 1. A pyroxene (angite) which has been altered to an amphibole (hornblende). The crystals have the form of augite, but the cleavage of hornblende. It is found in the Urals, Norway, the Tyrol, and in India. 2. The name given to a fireproof building material composed of chalk, silicate, and bicarbonate of soda and asbestos fibre.

Ural Mountains (the Hyperborean Mountains, or Rhippei Montes of the ancients) form part of the boundary between Europe and Asia, and separate European Russia on the W. from Siberia on the E. The chain extends S. from the Kara Sea, an arm of the Arctic Ocean, to the middle course of the Ural R., a distance of about 1333 m. Its breadth varies from 16 to 66 m. The mineral riches of the chain are chiefly contained in the Middle Ural, commonly called *Rondnoi*

(metalliferous), and this section also contains the highest peaks, such as the Kanjakovski Kavcen (5000 ft.). The chief minerals produced are gold, copper, platinum, and iron.

Uralsk, a ter. of Russia, the larger portion of which is situated to the E. of the Ural R., the boundary line between Europe and Asia. The capital of the province is Uralsk, 1000 m. S.E. of Moscow, a 17th century town, which is the market for the trade in fish oil and caviare done by the province. The character of the territory of U. generally is barren and uncultivated. There are large expanses of steppes and deserts fringing the Caspian Sea. Salt lakes are common. U. is poorly provided with water, and in places is almost uninhabitable. The climate is vigorous and subject to extremes of temperature; the snowstorms in winter being very destructive. The chief occupations of the inhabitants are fishing and stock-raising. The history of U. is mainly the history of Russia, and the present dwellers there are made up of Russian cossacks, Russian peasants descended from the Nogai tribes and Kirghizes. The area is 137,679 sq. m., and the pop. 775,400. The pop. of the town, the capital of the province, is 38,919.

Urania, the typical genus of the lepidopterous family Uranidae, and consists of night-flying moths. The beautiful Madagascar moth is known in entomology as *U. rhipheus*.

Urania (Gk. οὐράνιος, heaven), in Greek mythology, one of the Muses the guardian of Astronomy. The name is also one of the appellations of Aphrodite.

Uranium (U, 238.5), a metal which occurs as oxide UO_2 , $2UO_3$, in pitchblende, and is found in Cornwall, Colorado, and Joachimsthal. The metal is prepared by several methods, but may be obtained by the reduction of the chloride with sodium. It is a hard white metal (sp. gr. 18.7), which melts in the electric furnace. Uranium forms the oxides UO_2 , UO_3 , and UO_4 , and also oxides U_2O_3 and U_3O_8 , which may be regarded as combinations of two oxides. Uranium dioxides (UO_2) and trioxide (UO_3) are both basic oxides, the former yielding the unstable uranous salts (e.g. uranous sulphate $U(SO_4)_2$) and the latter the uranyl salts (e.g. the nitrate $(UO_2)(NO_3)_2$). Uranium peroxide UO_4 gives rise to the per-uranates. The so-called uranium rays are a property of pitchblende rather than of the metal, and are probably due to radium present.

Uranometria, a star atlas or catalogue published by Bayer in 1601. In it Bayer used Greek letters, the

brighter stars being higher up the alphabet. Thus α Leonis is the brightest star in the constellation Leo. Although the supply of Greek letters was soon exhausted, and figures had to supplement them, the principal stars still bear the Greek letters given them by Bayer.

Uranus, in ancient Greek mythology, the husband of Gæa (Earth) and the father of Cronos (Saturn) and other Titans, Cyclops, and Hecatoncheires. He represents heaven and the generative power of the sky with its sun and rain. He was dethroned and mutilated by Cronos, and from his blood were formed the Gigantes on earth and Aphrodite in the sea. The Romans translated the name as Cælus.

Uranus, the first planet to be discovered since the invention of the telescope, was found by Sir William Herschel on March 13, 1781, and named by him *Georgium Sidus* in honour of King George III. It is the outermost but one (Neptune) of the planets, its distance from the sun being about twenty times that of the earth. It is four times the earth's diameter, and its mass one-twentieth that of Jupiter. In density it is about the same as the latter planet, i.e. slightly denser than water. Four satellites at least (the number is uncertain) attend U., the plane of their orbits being almost perpendicular to the ecliptic.

Uran, see CURARE.

Ura-tiube, Ura-tyube, or Uratepe, a tn. of Russian Turkestan, 100 m. N.E. of Samarkand. It stands on the highway from Fergana to Jizak and has a citadel and many mosques. Pop. 22,000.

Urban, the name of eight popes.

Urban I. was pope 222-30.

Urban II. (pope 1088-99), a Frenchman by birth, and originally a monk of Cluny. Soon after his election, he resumed possession of Rome, the fortresses of which had been occupied by the anti-pope, whom he compelled to withdraw, and was thus brought into further conflict with Henry IV. of Germany. A great council was held at Piacenza in 1095, in which the anti-pope and his adherents were excommunicated. In his later pontificate U. succeeded in driving Henry IV. out of Italy. He held a council at Bari in 1098, in which many Greek bishops were present, and in which the addition of the words *filioque* to the Creed was discussed. Thence he returned to Rome, of which he obtained full and undisturbed possession; and he died at the close of 1099, just at the time when the first crusade which he had organised terminated in the successful occupation of Jerusalem.

Urban III. (pope 1185-87), he became Archbishop of Milan 1182, cardinal 1185, and succeeded Lucius III.

Urban IV. (pope 1261-64), instituted the feast of Corpus Christi, 1264.

Urban V. (pope 1362-70), is remarkable as practically the last of the popes who resided at Avignon, and the one by whom the papal seat was for a time re-transferred to Rome. He was a native of France, and had been Abbot of St. Victor at Marseilles. After various alternations of peace and contest, U. went to Rome in October 1367. He found the papal city in a condition all but ruinous, and the whole of Italy overrun by bands of mercenaries. He endeavoured to repress these disorders, but with little success; and in 1370 he returned to Avignon where he died.

Urban VI. (pope 1378-89), under whom the great Western Schism had its origin, when Clement VII. was elected anti-pope in 1378. U.'s name was Bartolomeo Prignano, and at the time of his election he was Archbishop of Bari. Clement took up his residence at Avignon. U., on the contrary, remained at Rome, where he appointed twenty-six new cardinals, and excommunicated Clement and his adherents. U. was recognised as the lawful pope by one portion of the West, Clement by the other, and each maintained his claim by measures of the most extreme character. U. having engaged in a dispute with Charles, king of Naples, whom he had himself crowned, he was besieged by that prince at Novara, whence he withdrew to Genoa, taking with him, as prisoner, several to death.

way to Ferentino, he fell from his horse, and died from the injuries thus sustained.

Urban VII. (pope Sept. 15-27, 1590).

Urban VIII. (pope 1623-44) was the successor of Gregory XV. His family name was Maffeo Barberini. In the difficult position of Roman affairs, as complicated between France, Austria, and Spain, in the war of the Valtellina, to which he succeeded on his first election, he acquitted himself with much dexterity. His

signalised by Holy See of the

1626. He was brated college of the Propaganda, and to him Rome is indebted for many public works, including large and important additions to the Vatican Library. Some of the early stages of the Jansenist controversy fall within this pontificate.

Urbana: 1. The cap. of Champaign co., Ohio, U.S.A., 42 m. N.W. of Columbus; the seat of a Swedenborgian university. Pop. (1910) 7739. 2. The cap. of Champaign co., Illinois, U.S.A.; 61 m. N.W. of Terre Haute, the site of the Illinois University and state laboratory. Pop. (1910) 8245.

Urban District Council, see LOCAL GOVERNMENT.

Urbanists, see CLARE, ST.

Urban Sanitary Authority. See LOCAL GOVERNMENT.

Urbi et Orbi, a formula used to signify the universal application of a papal bull, the meaning being 'to the city (Rome) and to the world.'

Urbino (Lat. *Urbium Hortense*), a tn. in the prov. of Pesaro e U., the Marches, Italy, between the Foglia and Metauro, 23 m. S. by E. of Rimini. It has a fine ducal palace of the Montefeltro family (1468), a cathedral, free university (1564), and the house in which Raphael was born (1483). The manufactures include silk, majolica, bricks, and olive oil. Pop. 18,000.

Urdingen, a tn. of Prussia, in the Rhine prov., on the l. b. of the Rhine. Pop. 9758.

Urdu, a peculiar dialect spoken in India.

Ure, a riv. of N. and W. Ridings, Yorkshire, England, which rises 7 m. S.W. of Mukers, near the borders of Durham. It is about 70 m. long and joins the Swale, forming the Ouse.

Ure, Alexander (b. 1853), a Scottish politician and judge, born at Glasgow, and educated at Glasgow and Edinburgh Universities. He was

ed to the Scottish bar in 1878.

Since for he w

1909-13 Lord Advocate for Scotland. In Oct. 1913 he was appointed to succeed Lord Dunedin as head of the Scottish judiciary. His name has been prominent among the leaders of the 'Taxation of Land' campaign.

Ure, Andrew (1778-1857), a Scottish chemist and scientific writer, born at Glasgow, and studied at Glasgow and Edinburgh Universities. He was appointed professor of chemistry and natural philosophy in Andersonian University at Glasgow in 1804. He gave a course of lectures, in 1806 he resigned his professorship and went to London, where he practised as an analytical and commercial chemist. Among his works are a *Dictionary of Chemistry*, 1821; *Philosophy of Manufactures*, 1835.

Urea, or Carbamide, $\text{CO}(\text{NH}_2)_2$, a compound which occurs in the urine of mammals and of carnivorous birds and reptiles. It forms about 3 percent. of the human urine. It may be prepared from urino by evaporation to small bulk and adding strong nitric acid. The precipitated crude urea nitrate is recrystallised from nitric acid and dissolved in water. The solution is then decomposed with barium carbonate, evaporated to dryness, and the urea extracted with alcohol. In the laboratory, urea is more commonly prepared by heating ammonium cyanate. It forms colourless crystals (melting point 132°C.) soluble in water and alcohol, and combines with acids to form salts. It is decomposed on heating, and heated with sodium hypobromite gives off nitrogen. This latter property is used as a method of estimation. Urea was discovered in urine in 1773, and was artificially produced by Wöhler in 1828, the discovery being of fundamental importance as the first synthetical production of an animal product.

Uredineæ, see RUST FUNGI.

Urethra, in anatomy is the urinary canal extending from the neck of the bladder to the *meatus urinarius*, or orifice of the urethra.

Urfa, or Urfah, see EDESSA.

Urfé, Honoré D' (1567-1625), a French writer, born at Marseilles. His life, like his writings, was extremely romantic. After serving for some time in the wars of Henry IV. he married Diane de Château Morand, but the union was an unhappy one. His chief production was the pastoral romance *L'Astrée* (1610-18), which enjoyed unparalleled popularity for nearly half a century.

Urga, also called Bogdo Khuren, a tn. of Mongolia on the R. Tola, 180 m. S.E. of Kiachta. The city is divided into two main sections, the Chinese quarter and the Mongol quarter. Besides these there is a religious or monastic quarter, which is important as containing the residence of the Kutukta Lama, the head of the Mongolian Buddhists. It is an important commercial centre. Pop. 30,000.

Urgel, or Seo de Urgel, a tn. of Spain, in the prov. of Lerida, situated on the R. Segre, 74 m. N.W. of Barcelona; it is the see of a bishop, who supervises the republic of Andorra. Pop. 3000.

Urgeng, or Urghenj, a tn. of Russian Central Asia, in the Khanate and 17 m. N.E. of Khiva. It is also called New U. as opposed to the deserted Old U. Pop. 32,500.

Uri, one of the forest cantons of Switzerland. It is bounded by the

Lake of Lucerne and the cantons of Schwyz, Glarus, Grisons, Ticino, Valais, Bern, and Unterwalden. The principal river is the Reuss, whilst the St. Gothard Railway crosses the canton. Cattle-rearing is carried on, also cheese-making and bee-keeping, but more than half the surface is barren rock or glaciers. The chief town is Atdorf. The canton was the scene of fighting between the French and the Russians and Austrians in 1799. Area 415 sq. m. Pop. 18,500 (principally Roman Catholics).

Urial, Oorial, or *Ovis vignei*, known also as the Punjab wild sheep, a species of the genus *Ovis*, found chiefly in the Punjab, Afghanistan, and Persia. It has large, twisted horns, firmly set in the skull. The curve in the male is particularly great.

Uric Acid ($\text{C}_7\text{H}_4\text{N}_2\text{O}_6$), a product of the metabolism of the animal organism, and occurs in small quantities in human urine. It sometimes accumulates in the bladder, forming 'stones,' or is deposited in the tissues of the body (gout and rheumatism). The excrements of birds (guano) and of reptiles contains large quantities of the acid. Serpents' excrements consist chiefly of ammonium urate and the U. A. is prepared by boiling with caustic soda and the clear alkaline solution precipitated with hydrochloric acid. The acid forms crystals which are insoluble in water. Evaporated with nitric acid, a yellow stain is left, which becomes intensely violet on addition of ammonia. U. A. is a weak dibasic acid, and forms salts which are all sparingly soluble in water. The lithium salt is fairly soluble, and hence lithium compounds are used in medicine for gout and rheumatism, etc.

Uriconium, see WROXETER.

Urim and Thummin, two objects mentioned in the scripture narrative (P) as oracles through which the will of Yarweh was discovered on certain occasions. The earliest reference made to them is in 1 Sam. xiv. 41 ff, but no description of them is given in any place nor is anything more now known. They seem in some way to have been connected with the ephod or breastplate and served the purpose of lots. The R.V. translates by 'Light' and 'Perfections' (Exod. xxviii. 30).

Urinary Calculus, see CALCULUS.

Urine, the fluid excreted by the kidneys. It contains a large proportion of water together with some of the waste products of metabolism. The kidneys extract these waste products from the blood and pour their secretions into the ureter, by which

the fluid reaches the bladder, there to be retained for a while until it is discharged to the exterior by the urethra. It is not known how the U. is formed in the kidneys, though it is probable that the different constituents are secreted in different parts of the kidney tubule. The water and some salts are separated out at the glomerulus at the commencement of each tubule, and the other constituents are added in the convolutions before the U. reaches the pelvis of the kidney. U. as excreted is normally a clear amber liquid of sp. gr. about 1.02 and an acid reaction. It is a very complex liquid. The bulk of it is water, in which are dissolved mineral salts and organic substances, mainly nitrogenous. The mineral salts are chlorides, sulphates, and phosphates. The chief chloride is common salt, which varies in amount according to the amount in the food. The sulphates are formed by the oxidation of the sulphur contained in many of the proteid substances used as food. The phosphates come partly from the food and partly by the oxidation of phosphorus-containing substances in the tissues. The most important of the nitrogenous products in the U. is *urea* (CON_2H_4), which contains about 90 per cent. of the total nitrogen excreted. Urea is formed in the liver from the amino-acids resulting from the digestion of proteins. About 4 per cent. of the nitrogen in U. is contained in ammonia, which can often be detected by its odour. Other nitrogenous substances present in U. are uric acid, hippuric acid, and creatinin. Uric acid is present in excess in the U. of gouty patients. The amount of U. discharged by an adult man is about $2\frac{1}{2}$ pints *per diem* on the average. The quantity, however, is susceptible of wide variation, as it depends to a large extent upon the amount of fluid ingested, the amount excreted by the skin and lungs, etc. The excretion of U. also varies with the state of bodily health. *Polyuria*, or excessive discharge of U., may be caused by the use of one of the drugs known as diuretics, by diabetes mellitus, or by diabetes insipidus. A decrease in the amount of U. is caused by certain fevers, by forms of kidney inflammation, from obstruction in the urinary passages, etc. Abnormal constituents in the U. are often indicative of morbid conditions. A condition marked by the presence of blood or blood pigment is known as *hæmaturia*. This is indicative of injury or inflammation in kidney, ureter, bladder, or urethra. If the flow of blood only occurs at the beginning of micturition, the lesion is probably in the urethra. Where long

clots are observed, the trouble is probably in the ureter. *Pyuria* is a condition characterised by the presence of pus in the U. If the U. is alkaline the pus probably originates in the bladder; if acid, pyelitis, or inflammation of the pelvis of the kidney, is indicated. *Albumen* is present in the U. when the kidneys are diseased, and soon after the onset of inflammation can be detected. It may be detected by a coagulating agent, as nitric acid, to the U. *Sugar* may be detected by means of Fehling's solution. Its presence is indicative of diabetes mellitus. *Bile* may be present in cases of jaundice, giving a brownish appearance to the U. Among other abnormal aspects of urination are incontinence and retention of U. *Incontinence* in children is usually a matter of nerves. The micturition-centre is not properly under control, so that the child passes water without its own knowledge. This is apt to occur at night, and sometimes the habit remains very obstinate. The child should not be scolded as if for a fault. He should be encouraged to pass water just before going to bed, and should not be allowed to drink much fluid towards night time. If the child is frequently wetted, small

incontinence of U. may be due to over-distension owing to stricture of the urethra. It may be cured by treating the stricture. In women, incontinence of U. is often an accompaniment of hysteria. *Retention* of U. is sometimes, like incontinence, of purely nervous origin. Often, however, it is due to obstruction in the urethra, by the impaction of a stone or other cause. The bladder becomes enormously distended and can be felt as a hard ball rising up in the abdomen. If the obstruction persists, the bladder must be drawn off by an abdominal incision. This is due to paralysis of the bladder and there is therefore no urethral obstruction, the U. may be drawn off by a catheter.

Urin Sotokichi (b. 1857), a Japanese baron and vice-admiral, studied seamanship in Japan and U.S.A. After holding a number of important positions in the Navy he was in command of the second squadron in the Russo-Japanese War. His chief exploit was the blockading of Chemulpo, during which he sunk the Russian warships *Korietz* and *Varyag*. He was made a baron in 1907.

Urmia, see URMIYAH.

Urmston, a par. and vil. of Lancashire, England. 6 m. W.S.W. of Manchester. U. Hall is a mansion of the Tudor period. Pop. (1911) 7915.

Urn, a vase of marble, glass, or clay, used for water, vases at elections, etc., but especially for the ashes of the dead in ancient times. They were of various shapes and patterns and were often beautiful works of art. See Sir Thomas Browne, *Urn-burial*.

Urodela, see CAUDATA.

Uromastix, see AGAMA.

Urquahart, David (1805-77), a British diplomatist, born at Brae-langwell, Cromarty, and educated at St. John's College, Oxford, after having spent some time in France and Spain. He took part in the Greek War of Independence, and in 1835 was made Secretary to the Legation at Constantinople. He held this position for two years, at the expiration of which he made an extensive tour in the East, with a view to collecting evidence against the policy of Palmerstone. In 1847 he entered parliament in opposition to Palmerston's ministry. His political publications are numerous, and include: *Turkey and its Resources*, 1833; *Letters and Essays on Russian Aggression*, 1853; *The Occupation of the Crimea*, 1854.

Urquhart, Sir Thomas (1611-60), a Scottish author and translator, educated at King's College, Aberdeen; his education being completed with the usual continental tour. During the Civil War he fought and underwent imprisonment for Charles I., but of the latter years of his life very little is known. In 1652 he published his *Ἑκοντὴν ἀνθρῶν*, better known as *The Jewel*. In the following year was published the first part of the work that has made his name famous, the translation of Rabelais (*Tudor Translations*, 1899), one of the most perfect translations ever made.

Ursa Major (the Great Bear), the best known of all the constellations, is popularly known as The Waggon (Charles's Wain), the Plough, and, in America, the Dipper. The constellation can be found quite easily, for it is never below the horizon in the latitude of Britain. It is a useful guide to finding the Pole Star, the nearest bright star to the celestial pole. This star is found by projecting a line joining the two right hand stars of the seven bright stars which form the stellar framework of the Bear. For this reason these two stars are known as 'the Pointers.' By continuing the sweep of the tail of the Bear (or handle of the Plough or Dipper) the bright star Arcturus (*α.υ.*) is reached, a name by which the Bear has sometimes been called. ζ Ursæ Majoris (or Mizar), the first recorded double star, is a spectroscopic binary with a period of 104 days and a velocity of 100 miles per second. The proper motions of all the principal

stars except Alpha are almost identical.

Ursa Minor (the Little Bear), a small constellation chiefly remarkable for the fact that Polaris (the Pole Star) is situated at the end of its tail. The parallax of Polaris was found by Mr. C. A. F. Peters to be .076, which indicates a distance in light-years of 42.45.

Ursinus, Fulvius (1529-1600), an eminent Italian scholar, born at Rome. He became a priest, and finally succeeded his benefactor, the Canon Gentilio Delfini. He was librarian to two cardinals, and was granted a pension by Pope Gregory XIII. He procured many valuable books and ancient MSS., and formed an archaeological museum. His own works are mainly commentaries on classical authors, e.g. *Scriptores Rei Rusticæ*, or editions of them, and among his original works is the *Familiæ Romana*.

Urson, the popular generic name of the Canadian tree-porcupines which form the genus *Erethizon*. It contains only two species.

Ursula, Saint, of Cologne, is said by the ancient legend to have been put to death at this place some time in the 3rd, 4th, or 5th centuries by the Huns, together with eleven thousand virgins, her companions. Even in the middle ages this popular story was viewed by many with suspicion and it is now universally recognised that the greater part of it is fabulous. There is no certainty, however, as to the origin of the legend.

Ursulines, an order of nuns in the Roman Catholic Church founded about 1537 by Angela da Brescia (c. 1511-40). Its institution was confirmed by Paul III. in 1544, and it was at this time that the order received its present name, from the name of its patron, St. Ursula. The nuns are mainly employed in educational work.

Urticaceæ, an order of dicotyledons known to us chiefly because it contains the stinging-nettles. Most of the species are herbaceous or shrubby, have no latex, and often have stinging-hairs; the leaves are usually alternately and stipulate. The perianth consists of from four to five free or united leaves, and the unicellular ovary contains one ovule. *Urtica*, *Parietaria*, and *Boehmeria* are the chief genera.

Urticaria, see NETTLE-RASH.

Uruguay, known locally as the Banda Oriental del Uruguay, a republic in S. America, situated between Brazil and the Argentine, on the Atlantic coast. The surface consists of a level plain traversed in the S. by low ranges of hills and bounded on the N. by mountain ranges, including

the Cuchilla de Haeda and the Cuchilla Grande. The chief rivers are the Uruguay and the Negro. U. has a beautiful climate, and therefore the vegetation is very rich. Wheat, oats, barley, maize, linseed, and tobacco are cultivated. Cattle and sheep rearing is, however, the principal occupation, vast herds being reared, and live stock, meat, and wool exported to Brazil, U.S.A., France, and Great Britain. From U., too, is obtained the meat extract used at the Liebig factory, the refuse also being exported as a manure. Lead, copper, manganese, and a little gold and silver are mined. The imports include cotton and woollen goods and machinery. The chief port and capital is Monte Video. Transport facilities are good, there being many railroads, tramways, and roads, as well as the rivers, which are navigable for hundreds of miles. The government is vested in a senate, consisting of nineteen members, and a chamber of deputies, chosen by the people in the ratio of one to every three thousand. The president is elected for four years, and the law is based on the Code Napoleon. Education is nominally compulsory, and the revenue is mainly derived from import and export duties. The original inhabitants were pure Indians. Later the country was held by the Spaniards, forming part of the viceroyalty of Buenos Ayres, while afterwards it came under the dominion of Portugal, and was attached to Brazil. When Brazil declared its independence of Portugal, Portugal strove to retain U., but on the mediation of Great Britain, U. was formally constituted as a republic in 1828. As is well known, unrest and trouble are constant. Pop. 1,112,000. See R. J. Enoch, *Republics of South America*, 1913.

Uruguayana, a tn. and fortress of Brazil, on the Uruguay R., in the prov. of Rio Grande do Sul. It is situated on the Itaquy-Quaraby Railway, and is an important centre of commerce. In 1817 the battle deciding the independence of the Uruguay Republic against the Portuguese was fought here, whilst here 1865 Estigarribia surrendered to Emperor of Brazil. Pop. 11,500.

Uruguay River, see PARANA.

Urumia, Urmia, or Daria Shah, a lake of Persia, in the prov. of Azarbaijan, situated in a depression between the mountains at a height of 4500 ft. It is very salt and is fed by the Aji Chal, Jaghatu, Tatan, and Zuia. Its outlet is unknown. Its length is about 90 m., breadth 20-30 m., and area 1600 sq. m.

Urumiah, Oroomiah, or Urmia, a tn. in the Persian prov. of Azarbaijan,

70 m. S.W. of Tahriz. It is a summer resort, the see of a Nestorian bishop, and is supposed to have been the birthplace of Zoroaster. Pop. 50,000.

Urumtsi, or Urumchi (Chinese Tikwa Chou), a tn. of Zungaria, China, 320 m. E.S.E. of Kulja. It is surrounded by double walls and is the headquarters of the Chinese government in Turkestan; it commands the only defile suitable for artillery between Zungaria and E. Turkestan. Pop. 25,000.

Urus, the name applied by the Romans to *Bos primigenius*, an extinct wild ox, and it is now sometimes attached wrongly to the aurochs.

Urville, J. Dumont D' (1790-1842), see DUMONT D'URVILLE.

Usbegs, see Uzbegs.

Usedom, an island belonging to Pomerania, Prussia, and separating, with Wollin Island, the Pomeranian Gulf from the Baltic. Agriculture and fishing are carried on, and the island is popular as a summer resort. The chief towns are Swinemünde (9000) on the R. Swine, and U. (2000) on the S.W. of the island. Area 158 sq. m. Pop. 37,500.

Usertes, three Egyptian kings belonging to the Twelfth Dynasty (according to the numbering of Manetho). *Usertes I.* was the second king of the dynasty and his reign is placed by Duncker between 2380 and 2371 B.C. Some scholars place the whole about four hundred years later. He erected obelisks at Heliopolis and Fayum, and carried on hostilities against Nubia and Cush. *Usertes II.*, grandson of the former, began to reign about 2300 B.C., and continued the campaigns of his grandfather in S. Egypt. The conquest of this part of Nubia was finally completed by *Usertes III.* (2221-2179 B.C.), the builder of the famous temple at Heracleopolis. See Duncker, *History of Antiquity*, vol. 1. (Eng. trans. 1877), and Petrie, *History of Egypt*, 1899.

Uses, in law, the benefit or profit as detached from legal ownership, implies a trust or in some one for the holding of lands, and all modern conveyances are directly or indirectly founded on the doctrine of U. and trusts, which doctrine has rightly been regarded as the most technical and intricate part of the real property law of England (cf. *doctrino was and was em- corporations to evade the statute of mortmain (see CHARITABLE TRUSTS; and Mort-*

MAIN), and by landowners to evade feudal burdens, or to make land devisable by will at a time when that was impossible by common law (*q.v.*). The effect of the statute of U., 1535, the object of which was, by *executing* the use or turning it into the full legal estate, to circumvent the above devices, was not what the legislature had hoped; because the courts soon held that only the first and not subsequent *uses* was executed; hence if A left land 'to B to the use of C to the use of D,' C had the legal but D the beneficial ownership. These judicial decisions defeated the main policy of the statute, and restored U. under the now more familiar name of trusts, and hence brought about the whole modern system of 'equitable estates.' If land be conveyed to A to the use of B, B has the possession vested in him; but if the conveyance be to A, to the use B *in trust* to permit C to enjoy the profits, B has the legal, but C the equitable, estate (*q.v.*). U. apply only to lands of inheritance and therefore are inapplicable to leaseholds. *Springing use* is one limited to arise on a future event where no preceding use is limited. For example, if A seised in fee grants 'to B upon A's own marriage to hold to the use of A for life with remainder to A's first and other sons in tail,' life estates and remainders 'spring' up by way of use on the event of A marrying (*see* SETTLEMENT). *Shifting use* is one which, though executed, may change or shift over to another person by circumstances. For example, if A grants 'to B upon A's own death to hold to the use of C, and his heirs, but if C do not within three years take the name and arms of A, then to use of D and his heirs,' the land goes to D if C does not fulfil the condition mentioned. *Contingent use* or remainder is one limited (*see* LIMITATION) to a person not ascertained, or upon an uncertain event but without derogation of a prior U. *Resulting use* is one which expires or cannot vest, and therefore is said to result or return to him (or his heirs) who created it.

Ushak, a tn. of Turkey in Asia, in the vilayet of Brusa, 55 m. N.E. of Alashehr, and connected by rail with Smyrna and Kona. It is famous for pile-carpet weaving. Pop. 15,000.

Ushant (Fr. *Ouessant*), an island in the dept. of Finistère, France, 27 m. N.W. of Brest. It has steep coasts, with a fertile soil; fishing is the chief industry, and the small port of Ouessant on the S.W. is the only town. There are two lighthouses and a telegraph station. Area 20 sq. m.; Pop. 3000. There were two battles fought off Cape U. in the 18th century. The

first was between the French under D'Orvilliers and the English under Keppel in 1778 and was indecisive. The second was fought the 'glorious first of June, 1794,' when Admiral Lord Howe gained a great victory over the French under Villaret-Joyeuse, capturing seven vessels.

Ushas, the Hindu goddess of the dawn to whom beautiful Vedic hymns are addressed. She is the life and breath of all things. She is born afresh each day, and has ruddy steeds yoked to her shining car.

Usher (or Ussher), James (1581-1656), an Anglican theologian, prelate, and scholar, born in Dublin and educated at Trinity College, Dublin, where he took the degree of M.A. in 1600. In 1603 he was made chancellor of St. Patrick's Cathedral, Dublin, and from 1607-20 was regius professor of divinity at Trinity College. In the latter year he became Bishop of Meath, and in 1624 archbishop of Armagh and primate of Ireland. He sided with Charles I. during the civil war, consequently losing much of his property in Ireland. He was preacher to the Society of Lincoln's Inn from 1647 until just before his death. His scholarship was great and his *Annales Veteris et Novi Testamenti* proposed a scheme of biblical chronology universally accepted at the time.

Usk, a par. and market tn. of Monmouthshire, England, situated on the G.W.R. 6½ m. E. of Pontypool and 12 m. S.W. of Monmouth. There is an old castle, and the church was originally attached to a 13th-century Benedictine nunnery. Pop. 1600.

Usk, a riv. of Brecknock and Monmouth, flowing S.E. into the Bristol Channel at Newport. It has a length of 37 m. and is noted for salmon.

Usk, Thomas (b. 1388), the author of *The Testament of Love*, an important prose work formerly ascribed to Chaucer, was born in London. He was the principal witness against John de Northampton in 1384, and in 1388 was executed by order of the 'Merciless Parliament.' *The Testament of Love*, apart from its historical and philological interest, has no literary merit. Wilhelm Hertzberg in 1866 proved that it was not written by Chaucer.

Usnea, a genus of lichens, typical of the family Usneaceæ, found growing on rocks and trees of cool countries. *U. barbata* is the tree-moss, beard-moss, hanging-moss, or neck-lace-moss.

Uspallata, the name of a pass in the Andes, between the Argentine Republic and Chile. It is situated in lat. 32° 50' S., and is about 12,800 ft. high at the highest point. The Trans-

Andine Railway, which was opened for traffic in April 1910, runs through this pass.

Ussing, Johan Ludwig (1820-1905), a Danish archaeologist and philologist. He travelled in Italy and Greece (1844-46), and was professor of classical philology and archaeology at Copenhagen (1849-95). His publications include:

Græcæ ineditæ, 1847;
tionēs tres de lege agr

Wasatch Mts. (highest peak Timpanogos, 11,957 ft.) shut off the western section, which belongs to the Great Basin of the continent, and consists of highlands running N. to S. separated by valleys of desert wastes—from the eastern, which belongs to the Colorado basin, and is remarkable for its lofty plateaus through which its passage. an offshoot mentioned. variations in

terricht bei den Griechen

Danish 1863-65, German 1885; and *Betragtninger over Vitruvii de architectura libri x.*, 1896.

Ussing, Tage Algreen (1797-1872), a Danish radical statesman and jurist, born in Zealand. He became assessor to the High Court, and urged the union of the duchies of Schleswig and Holstein to Denmark at the Roskilde meeting (1844). He was councillor of state (1846 and 1854-66), deputy from Copenhagen to the Diet (since 1834), and procurator-general of Denmark (1848). U. was the author of *Laeren om Servitut*, 1836; *Haandbog i den Danske Arvret*, 1855; and *Haandbog i den Danske Criminalret*, 1859.

Usufruct, in Roman law, the temporary use and enjoyment of lands or tenements, or the right of receiving the fruits and profits of lands or personal property belonging to another, without having the right to alienate or change the corpus or property itself. The usufructuary's rights when in the nature of personal as opposed to predial servitudes, necessarily subsisted only so long as the substance of the thing used remained unimpaired.

Usulután, a tn. of Salvador, Central America, situated about 70 m. S.E. by E. of that city.

Usury, formerly denoted any legal interest for the use of money, but in present usage denotes only illegal or excessive interest. By an Act of 1714 the legal interest in England was fixed at 5 per cent., and all contracts made for the payment of any principal to be lent on usury above that rate were null and void. The legislature has now abandoned the policy of fixing a limit. Where, however, interest is recoverable on a contract, 5 per cent. is usually, though not invariably, the rate allowed by the court. See also INTEREST; MONEYLENDER.

Utah, an almost rectangular state belonging, since 1896, to the American Union and confined by Nevada (W.), Idaho and Wyoming (N.), Colorado (E.), and Arizona (S.). The

is one of extremes. Every attempt is being made to reclaim the vast tracts of unfertile soil by irrigation. The chief crops are wheat, oats, potatoes, and hay, but the growth of nursery produce and fruits is now encouraged. Cattle raising engrosses much attention. Copper, and after that silver, lead, and gold are the most valuable minerals. The manufacture of flour and of railway cars, and also printing, are the chief industries, but there are copper and lead smelting works and beet sugar factories. U. was ceded by Mexico to the states in 1848. It has been colonised by Mormons. The capital is Salt Lake City, situated on Great Salt Lake in the N. Area 84,990 sq. m. Pop. (1910) 373,351.

Utakamand, or Ootacamund, a municipality and tn. in the dist. of Nilgiri Hills, Madras Presidencry, British India, 36 m. N.N.W. of Coimbatore. It is pleasantly situated at a height of some 7000 ft. above the sea, and is the principal sanatorium and summer resort of the presidency. The Lawronce Asylum, the botanical gardens, Hobart Park, recreation grounds, and government cinchona plantations are the chief features of the town, in addition to the large artificial lake (1½ m. in length). Pop. 20,000.

Utamaro (1754-1806), a Japanese artist of the Ukiyō school, known chiefly by his coloured wood-cuts, born at Yedo; he was the son of a painter of distinction, Toriyama Sekiyen. While still a boy he manifested a taste for dissipation, and, being disowned by his father in consequence, he went to live with a famous print-seller, Tsutaya, and thenceforth his life was mainly devoted to depicting the beauties of the Yoshiwara, while he also issued a series of drawings of insects. His work gradually became very popular, his fame penetrating even to China; but in 1804 he issued a print libelling the reigning Shogun, and accordingly he was put in prison, where he died. U. was probably the first Japanese artist to become well known in

Europe, many of his prints being sent there during his lifetime by Dutch merchants resident at Nagasaki. As a draughtsman he has few rivals even among the greatest masters, his lines invariably reflecting inimitable grace and rhythm, while as a colourist he holds an equally high place, almost everything from his hand enshrining the most subtle and delicate tints. See Ricketts, *Pages on Art* (London, 1913); *Life*, by Edmond de Goncourt (Paris, 1891).

Uterus, or **Womb**, the organ in which the development of the ovum takes place. It is a pear-shaped organ, flattened and about 3 in. long in the non-pregnant condition. Its position is between the bladder and the rectum, with the base directed forwards and upwards; the cylindrical neck or *cervix* is directed towards the vagina, with which it communicates by the *os uteri externum*. This orifice is small and elliptical in the virgin, but after pregnancy remains much wider. The wide portion, or *fundus*, of the U. receives the Fallopian tubes at its two upper angles. The fundus is triangular in form, the apex being a constriction called the *os uteri internum* leading to the *corvix*. The walls of the U. consist of mucous membrane as its inner surface continuous with that of the vagina, a thick layer of muscular tissue, and an outer surface of peritoneum. The peritoneum is reflected outward to the wall of the pelvis and forms a means of suspension for the organ. This arrangement not only provides for a great degree of mobility, but also allows for considerable distension in pregnancy. During the period of sexual activity, from puberty to the menopause, the U. discharges about 6 ozs. of blood and mucus at intervals of twenty-eight or thirty days. The chief function of the U. is, however, the development of the fertilised ovum. The ova are carried from the ovary to the U. by way of the Fallopian tubes. After the ovum has been fertilised, it depends for the nourishment necessary for development on the U., which is furnished with structures adapted to that end and for carrying away the waste products of the foetus. The U. is the seat of many disorders which are dealt with in that branch of medicine known as gynaecology. Owing to its mobile situation, the organ is subject to many varieties of displacement. Flexion, whether an excessive bending forward or a reversal of the normal flexion, leads to difficulties of menstruation and possible sterility. Inversion is caused by difficult parturition or by the

presence of a polypus. Prolapse occurs when the U. is engulfed into the vagina; it may even protrude through the vulva. After being replaced by the fingers it should be kept in position by a pessary. Inflammation of the mucous lining of the U. is called *endometritis*. It is due to the extension of infective inflammation from other structures, or to sepsis following the expulsion of the foetus. Treatment consists of irrigation with antiseptic fluids, with care of the general health. The U. is a very common seat of tumours, both benign and malignant. Fibroids or myomata may persist for years without giving indications of bad health. On the other hand, they may cause sterility or lead to excessive hæmorrhage. Cancer of the U. is most common towards the climacteric period. Hæmorrhage or enlargement may indicate the existence of a growth. Surgical treatment at an early period of the disease often leads to a cure.

Utica, an ancient city of N. Africa, situated 25 m. N.W. of Carthage in the present dist. of Tunis. It was founded by the Phœnicians in 1101 B.C., and after the destruction of Carthage (146 B.C.) rose to be the first city of Africa, and capital of the Roman province.

Utica, a city and cap. of Oneida co., New York, U.S.A., situated on the R. Mohawk and the Erie Canal, 83 m. W.N.W. of Albany. It is a railway and canal centre, and has manufs. of cotton goods, hosiery, engines, etc., iron and brass castings, fire-bricks, boots and shoes, etc. Fort Schuyler, on the site of which U. is built, was built in 1758. Pop. 62,000.

Utilitarianism may be summarised by its own catch-phrase, 'the greatest happiness of the greatest number,' such happiness being the criterion of ethical right and wrong, and pleasure and freedom from pain the only desirable ends of life. Although the term originated with Bentham as a purely philosophical and political expression, the theological line beginning with Bishop Cumberland, including John Gay and Abraham Tucker, and ending with Paley, had already covered the same ground from the purely ethical point of view, identifying happiness with virtue. U. proper began with Bentham, whose *Principles of Morals and Legislation* must be regarded as the origin of the movement which culminated in John Stuart Mill. J. S. Mill defined U. on more broadly sympathetic and less selfish lines than Paley and Bentham, as 'the creed which accepts as the foundation of morals utility, or the greatest happiness principle, holds

that actions are right in proportion as they tend to promote happiness, wrong as they tend to produce the reverse of happiness.' Morality, he says, consists 'in conscientious shrinking from the violation of moral rules, and the basis of this conscientious sentiment is the social feelings of mankind, the desire to be in unity with our fellow-creatures.' A new aspect of U., considered on biological or evolutionary grounds, was pointed out in Darwin's *Descent of Man*, and followed up by Herbert Spencer and Sir Leslie Stephen. The name of Henry Sidgwick must also be men-

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Utopia (nowhere; Gk. οὐ, not, and τόπος, place) was the name given by Sir Thomas More to the imaginary island described in his *De Optimo Reipublicæ Statu, deque Nova Insula Utopia*, published in Latin in 1516, and translated in 1551, by R. Robinson. This romance speedily attained considerable popularity, and from it the adjective Utopian has been formed to mean 'impracticable,' or 'ideal,' particularly as applied to schemes for improving social conditions.

Utrecht: 1. A tn. of Natal, S. Africa, situated 135 m. N. of Pietermaritzburg. Fruit growing is carried on, and coal has been found. The town is the capital of the district of Utrecht, which was annexed to Natal in 1903. Pop. 5000. 2. A prov. of the Netherlands, bounded by N. Holland, the Zuyder Zee, Gelderland, and S. Holland. The soil is sandy and sterile in the E., but more fertile in the W. Area 534 square miles. Pop. 280,000. 3. The cap. of the prov. of Utrecht, is situated on the Old Rhine, 35 m. E. of the Hague. It is the seat of a Roman Catholic and of the Old Catholic archbishopsrics. Among the principal buildings are the remains of the cathedral (damaged by a hurricane in 1671), the University (founded 1633), and an archiepiscopal museum. The chief manufs. are cloth, woollen goods, silk, carpets, pottery, organs, chemical products, needles, salt, gin, etc. U. is very ancient, being known to the Romans as Trajectus ad Rhenum; it was the residence of the powerful prince-bishops of the 8th century and after, and also of the German emperors. The Treaty of Utrecht (1713) was signed here, ending the War of the Spanish Succession. Pop. 110,000.

Utrera, a tn. of Spain, situated in the prov. of Seville, 20 m. S.E. of the chief tn. Pop. (of com.) 15,500.

Utricularia, a genus of plants belonging to the order Lenticulariaceæ. The most common English specimen is the *U. Vulgaris*, or Greater Bladderwort.

Utterson, a tn. of Prussia, in the prov. of Schleswig-Holstein, on the R. Rinnau, 17 m. N.W. by W. of Hamburg. Pop. 5500.

Uttoxeter, a tn. of Staffordshire, England, situated 12 m. N.E. of Stafford. Hardware manuf. is carried on. Pop. 5500.

Thomas (1782-1857), an artist, born in London, and there. He became an exhibitor of the 'Old Water-Society' in 1809, and in 1813

a full member. In 1817 he travelled in Franco, and in 1824 went to Italy for seven years. He was elected an associate of the Royal Academy in 1833, and a member in 1838. In 1841 he was made librarian of the Royal Academy, in 1845 surveyor of pictures to the queen, and in 1847 keeper of the National Gallery.

Uvula: 1. A small cone-shaped hanging process suspended from the middle of the lower border of the soft palate. It is formed by the azygos uvulæ, levator palati and tensor palati muscles, mucous membrane, and connective tissue. 2. A small offshoot of the inferior vermis of the cerebellum, constituting the posterior limit of the fourth ventricle. 3. A slight elevation of mucous membrane projecting from the anterior and lower part of the bladder to the urethral orifice. This is known as the uvula vesicæ.

Uxbridge, a par. and market tn. of Middlesex, England, situated on the R. Colne, 18 m. N.W. of London. Brewing, brick-making, iron-founding, and market gardening are carried on. Here in 1645 the unsuccessful negotiations between parliamentarians and royalists took place. Pop. 9000.

Uzbegs, or Usbeks, form a branch of the Turkish family of Tartars. They are supposed to be of Uigur origin, descended from a tribe which migrated from Kashgaria to Western Turkestan. Their blood is mixed in different localities with Aryan, Kipt-

and are the influential class.

Uzes, a tn. of Franco, 12 m. N.E. of Nîmes; it has manufs. of silk and lace. Pop. 5000.

V

V, as pronounced by the English, is the pressed or medial labial aspirate, bearing the same relation to *f* that *b* does to *p*. Its form is only a variety of the character by which the vowel U is denoted, the latter being in its origin the cursive character employed with soft materials, while V is better adapted for writing on stone. The Roman letter U was probably pronounced as a *w*, a supposition which would explain the fact that in the alphabet of that language one character is employed for both *u* and V. The converse of this appears in the German alphabet, where *w* has nearly the power of *v*, while the latter symbol is used to designate the sound of the English *f*. V is interchangeable with *b* and *m*. It is also interchangeable with *f*, and hence the confusion between the characters *f*, *v*, and *w*.

Vaal, a riv. of S. Africa, trib. of the Orange R., which rises in Mt. Klipstapel, flows W. and S.W., separating the Orange Free State from the Transvaal, and crosses Griqualand W. A weir 1100 yds. long has been made across it at Parys for the purpose of irrigating about 2000 acres of land. Important diamond diggings are in and near the bed of this river.

Vaals, a vil. of the Netherlands, 4 m. from Aix-la-Chapelle, with manufactures of cloth. Pop. 7514.

Vaccinaceæ, a natural order of small shrubby plants with bell-shaped flowers followed by juicy acid berries, among which are the cranberry and whortleberry or bilberry.

Vaccination, the inoculation with cow-pox in order to afford protection against small-pox. The idea of vaccination first occurred to Dr. Edward Jenner (1749-1823) in connection with a belief, popular in his native county of Gloucester, that persons affected with cow-pox were thereby rendered immune from small-pox. His views met with opposition among medical men of the best reputation, and it was not until 1798 that he succeeded in demonstrating that vaccinated subjects were immune, at least for a time. V. was made compulsory in Bavaria in 1807, Denmark in 1810, Sweden in 1814, Prussia in 1835, United Kingdom in 1853, and the German Empire in 1874. There is no federal law compelling V. in the U.S.A., but many of the states enforce it. It is claimed that the decrease in the incidence and in the virulence of small-pox is due to the

practice of V. A most cogent fact is that whereas small-pox was formerly a disease more especially of childhood, the young and therefore freshly vaccinated have been seldom attacked in recent epidemics. Again, hospital attendants and medical men who are re-vaccinated at intervals have not been known to contract the disease. The opponents of V., besides resisting the interpretation that V. is the main factor in the diminution of small-pox cases, point to the fact that erysipelas and even syphilis have been caused or communicated by cow-pox inoculation. Now that the use of glycerinated calf lymph is general, the danger of syphilis is obviated, and it is generally conceded that the marked good effects produced by the general practice of V. more than compensate for the remarkably few cases in which the inoculation terminates unfortunately. The law of England now requires parents to procure the V. of their children within six months from birth, unless they have, within four months of birth, satisfied a court of petty sessions that they have a conscientious belief that such V. will be injurious to the health of the child.

Vaccination Acts. The first Vaccination Act, passed in 1840, provided means of vaccination, at the public cost, for every person in the United Kingdom, but left it purely optional whether he should avail himself of his statutory advantages. The next Act, that of 1853, made vaccination compulsory in England, and in 1861 the Poor Law Guardians were authorised to appoint persons to initiate and conduct proceedings for the purpose of enforcing obedience to the Vaccination Acts. A technical difficulty soon arose in enforcing penalties for disobedience against parents who, having been fined, persisted in refusing to have their children vaccinated and then availed themselves of the time-honoured legal principle that no one can be punished twice for the same offence. The result was that in 1867 the Vaccination Acts were repealed by the Act of that year. The chief amending provisions of this Act provided that a parent, or person having the custody of a child, who neglected without reasonable excuse to take it to be vaccinated, or inspected after vaccination, should be liable to summary penalties. Apparently this provision met the above-noted di-

lomma, for the High Court held in the case of *Allen v. Worthy* that a parent might be convicted and fined over and over again so long as he remained contumacious. There ensued, as usual, widespread opposition to the Act, or rather to the principle of compulsory vaccination, which opposition continued with varying phases of fortune even after the passing of the Act of 1898, which recognised the counter principle of conscientious objection. In the meantime the Consolidating and Amending Act of 1871 was passed. The principal amending provisions of the Act are those which empower the Local Government Board to make regulations for carrying out the Vaccination Acts, and punish persons who sign false certificates of unfitness of children for vaccination, or who refuse to permit the vaccinator to ascertain the result of the vaccination, and empower a Poor Law medical officer, when attending a small-pox patient, to vaccinate and re-vaccinate any person resident in the same house. In 1888 an order of the Local Government Board was issued reducing the age limit for re-vaccination from fifteen to twelve years in ordinary circumstances, and ten years when there was danger of small-pox. In 1889 a Royal Commission was appointed to inquire, among other things, into the effect of vaccination in reducing the prevalence of, and mortality from, small-pox, what other means there were for diminishing the disease, and the nature and extent of the alleged injurious effects of vaccination. The report of the Commission was on the whole against the contentions of the anti-vaccinators; but in 1898 Mr. Chaplin, then president of the Local Government Board, introduced an amending bill in the House of Commons. The important provisions of this Act of extension of the age period of vaccination to six months after birth, and substitution of glycerinated calf lymph for arm-to-arm vaccination or 'humanised lymph,' and, above all, the admission of the new principle that a parent who conscientiously 'objected' should escape the penalty for omission to vaccinate by delivering to the district vaccination officer a certificate, signed by two justices, a stipendiary or metropolitan police magistrate, or his conscientious objection. The Bill was passed on Aug. 12, 1898, and though made experimental for five years, has always been renewed by the Expiring Laws Continuance Acts. In 1901-2 small-pox once more became epidemic in the United Kingdom, and there can be little doubt that this was due in no

small measure to the Act of 1898. Another result of the Act was the tremendous increase in the cost of public vaccination. Anti-vaccination leagues continued to be formed in spite of the Act of 1898, by reason, mainly, of the fact that justices were not readily inclined to be satisfied of the conscientiousness of the objectors, and eventually, in 1907, the last Vaccination Act was passed. This provided that the conscientious objector should make a statutory declaration within four months of the birth of the child of his objection, and send such declaration within seven days by post to the district vaccination officer.

Vaccine-therapy, a method of curing infective diseases by inoculation with the virus of the causative micro-organisms. The theory owes its origin to Dr. Jenner's discovery of vaccination in the restricted sense; that is, the inoculation of healthy persons with cow-pox in order to

patients have been inoculated while they are ac-
disease, and
up to the pr

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s or bacterial
poisons, which in some cases are extremely virulent. The disease is fought in normal cases by the destruction of bacteria—a work in which the white corpuscles are especially engaged—and by the neutralisation of the toxins by substances called anti-toxins, which are elaborated by the body in some obscure way, under the

the injected serum contains, not bacteria, but only the anti-toxic substances elaborated by the horse or other animal inoculated with the disease. V., on the other hand, involves the

fection. Normal human serum does what is called opsonic action on bacteria; that is, it makes them more susceptible to destruction by the white corpuscles. In any particular case of disease the opsonic power of the patient's serum is compared with that of normal serum, the result being a ratio which is called the opsonic

index. The fluctuations in the opsonic index afford a valuable indication as to whether the injection of a vaccine is likely to aid in conquering the disease or not. When the opsonic index is rising (positive phase), it is an indication of increased immunity, which can be still further increased by the stimulus afforded by the injection of a dead culture of the micro-organism. When the opsonic index is falling (negative phase), the injections are discontinued. Vaccines have been used for typhoid fever, asthma, septicæmia, and local lesions caused by streptococci, pneumonia, Malta fever, etc. In most cases the results have been much more successful than serum treatment; although in diphtheria, for example, the protection afforded by antidiphtheritic serum has not been improved upon. Vaccines derived from the patient's own bacteria are the most useful; but it is not always practicable to prepare them, so that 'stock' vaccines are often used instead. See *Vaccine-therapy: its Administration, Value, and Limitations* (Proc. Roy. Soc. Med., Oct., 1910).

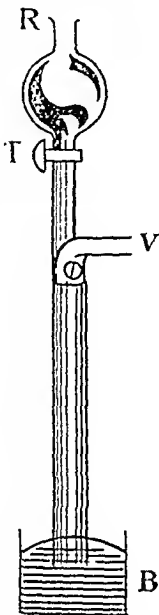
Vacherot, Etienne (1809-97), a French philosophical writer and statesman; became professor of philosophy at the Sorbonne in 1839, but was obliged to resign for refusing to take the oath, 1852. His two most important works are: *L'Histoire critique de l'Ecole d'Alexandrie*, and *La Métaphysique et la Science*.

Vacquerie, Auguste (1819-95), a French author and journalist; was born at Villequier, and became a great friend of Victor Hugo. His first literary work was *L'Enfer de l'Esprit*, a collection of poems. He afterwards contributed to *Evénement*, and wrote several comedies, including: *Souvent Homme varié*; *Jean Baudry*, and *Le Fils*. Other works are: *Les Funérailles de l'Honneur*, a drama; and *Futura*, a philosophical poem.

Vacuum, in physics, denotes a space which is perfectly free of matter, i.e. of solid, liquid, or gas. It is, perhaps, impossible to produce a perfect vacuum; for in the vacuum produced by an air pump, however far the exhaustion may be continued, there is always some air left in a more or less rarefied state. High vacua are generally produced by means of mercurial pumps, chief among these being the Sprengel pump. The principle of the pump may be explained by reference to the figure. Its essential parts are: the reservoir R containing mercury, the vertical tube connected to R by the tap T, and the tube V let into the side. B is a cup, in which the tube dips under mercury. As T is opened the mercury falls down the

tube and thus sucks in the air through V, to which the vessel to be exhausted is attached. The air bubbles are carried down to B where they escape at the surface of the mercury. If T is closed, the mercury rises in the tube and thus prevents a reflux of the air. The limit of exhaustion is that of nearly a perfect vacuum, providing the distance VB is greater than the height of the mercurial barometer. The application of liquefied gases of a very low boiling point is utilised with great success in this connection. This effects the condensation of the gas contained in the vessel. The vessel is attached to a tube which is surrounded by the liquefied gas; the gas in the vessel to be exhausted condenses in this tube, which is then sealed off. High vacua are measured generally by observing the character of an electric discharge through them (see VACUUM TUBES) or by the McLeod gauge.

Vacuum Engines are small engines capable of generating power varying from one-fifteenth to one-half of a horse-power. The principle which underlies their working is the creating of a partial vacuum in the cylinder containing the piston, and thus allowing the atmospheric pressure to give the necessary impulse to the piston. The partial vacuum is commonly produced by means of a flame which is drawn into the cylinder during the outward stroke of the piston. This flame heats the gases inside the cylinder, some of the gas necessarily escaping through a suitable valve. By suitable valve arrangements the flame burns out before the return stroke of the piston. The cylinder is water-jacketed and thus the hot gases in the cylinder are cooled. This effects a partial vacuum, and the atmospheric pressure which acts on the exposed part of the piston pushes it into the cylinder. This operation and impulse are repeated for each revolution of the engine, which is far more complicated in its mechanism than might be inferred from this sketch.



For further details a text-book should be consulted.

Vacuum Tubes. If the brass terminals of a Wimsburt machine be brought near to one another during the working of the machine, the machine discharges itself by means of a spark across the air gap separating the two brass knobs, the frequency of the spark depending on the distance between the knobs. If an electrical discharge takes place through a rarefied gas, the character of the discharge is somewhat more complicated, depending on the degree of exhaustion of the tube which contains the rarefied gas. Such a tube is given in Fig. 1, the two terminals *k*

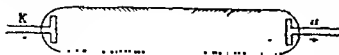


FIG. 1

and *a* being fused through the glass, the tube being exhausted by means of an air pump. Geissler tubes are V. T. having a shape as shown in Fig. 2. As the degree of exhaustion increases, the following changes in the character of the discharge occur.

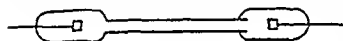


FIG. 2

Firstly, the tube is filled with a luminous column of a crimson colour, which extends the whole distance between the electrodes *k* and *a*. Secondly, the crimson colour disappears, the column splits up into luminous striæ (Fig. 1), and a dark space, called *Faraday's dark space*, appears near the kathode *k*, which is covered with a luminous glow. At a later stage the striæ become thicker and the Faraday space becomes less distinct. The luminous glow separates from the kathodes and gives rise to another dark space, *Crookes dark space*, around the kathode. At a higher degree of exhaustion the glow totally disappears and the tube is filled with the *Crookes dark space*, the surface of the glass tube becoming phosphorescent. Further exhaustion increases the resistance so much that discharge only takes place with difficulty.

Kathode rays.—When the exhaustion is such that the glass is phosphorescent and the tube is filled with the *Crookes dark space*, the tubes are said to be in a state known as *Crookes tubes* and by the fact that Crookes first examined the type of discharge. He believed that in the highly rarefied gas particles of matter charged with negative electricity

were shot off from the neighbourhood of the kathode with a very great velocity. The phosphorescence is caused by the impact of these particles on the sides of the tubes. This may be shown by inserting some obstruction in the path of the rays inside the tube. A shadow of the obstruction will be cast on the side of the tube, showing that the part enveloped in the shadow is free from the impact of the rays. Sir J. J. Thomson has shown conclusively that these rays consist of a stream of negatively electrified particles, in that the stream can be deflected by means of a magnet or by means of an electric field. By measuring the deflection produced in both these cases, Thomson obtained the velocity of the particles and the ratio of the mass of a particle to the charge on it. Later investigation by Thomson showed that the mass of an electron (one of the above particles) was 10^{-27} gram, or $\frac{1}{1836}$ part of a hydrogen atom.

Positively charged ions.—When has shown the existence of positively charged particles, which he obtained by means of a perforated kathode. These positively charged particles may be observed as luminous rays proceeding from the perforations at the back of the kathode. The mass of these ions appears to be that of the atom of ordinary matter, and their velocity is about 3.6×10^7 cms. per second.

Lenard rays.—Lenard showed that the kathode rays could be transmitted through the walls of the V. T. This was done by perforating the wall and covering the perforation with a thin plate of aluminium. The rays which strike against this plate can be detected outside the tube for a short distance. When outside the tube, the rays are known as Lenard rays, but as kathode rays when inside the tube. The size of the rays is that of the atoms. This experiment has confirmed to some extent the view that atoms are but aggregations of these small particles which are called electrons.

Röntgen or X-rays.—These were discovered by Prof. Röntgen in 1895. While experimenting with the kathode rays, he found that a covered photographic plate which was lying near was affected as though exposed to ordinary light. The Lenard rays can only penetrate a small distance in the air, and Röntgen concluded that the effect was due to some form of radiation which he termed 'X-rays.' Röntgen found that if the kathode rays fell on the glass anode or any plate in the tube, this radi-

tion was produced, and it was capable of penetrating many substances opaque to light. The degree of absorption of the rays depends on the density of the substance; the denser the substance, the more rays were absorbed. Thus metal or bone absorbs the rays more fully than does leather or flesh, and Röntgen easily succeeded in photographing coins in his purse and the bones in his hand. The rays produce phosphorescence on screens of platino-cyanide and similar salts, and by using these plates invisible objects may be made visible. The nature of the rays has not yet been fully established. The photographic effects and fluorescence suggested that they were ordinary ether waves, similar to light waves. These rays cannot be refracted, and only recently and with very great difficulty they have been shown to be capable of polarisation. Further, the rays are not affected by a magnetic or electric field of force, showing that they are not moving electrified particles. Sir George Stokes has suggested that the rays are single pulses travelling through the ether, i.e., electromagnetic impulses such as would be produced by the sudden stoppage of a moving electrified particle (for medical application see X-RAYS).

Ionisation of gases.—Generally speaking, all gases are good insulators, as may be seen from the fact that an electrified body suspended in the air will lose its charge very slowly, provided there is no leakage in the supports. If X-rays are passed through the air surrounding a charged electroscope, the instrument becomes rapidly discharged, showing an increase in the conductivity of the air. This conductivity may be produced under the action of the Kathode, Lenard, or X-rays, by radiations from radio-active substances and by means of a flame. Thus the air or gas has obtained a new property which it does not readily lose. This new property is explained by the presence of charged particles similar in character to the ions in an electrolyte. In electrolytes these ions are permanent, but in gases some ionising agent is necessary. Gaseous ions are easily removed by contact with solids or liquids, or by the action of an electric field. In the absence of these processes, the ions gradually disappear spontaneously because of recombination of the ions possessing opposite charges to form the original atoms. The velocities of these positive and negative ions were determined by Rutherford. He obtained the sum of the ionic mobilities of different gases. The velocities of the separate ions

cannot be determined from this result, but the ratio of the velocities determined by Hittorf combined with the results of Rutherford is sufficient to give the velocities of each ion. Zeheny measured these velocities by passing a stream of gas along a tube, and measured the distance the stream carried an ion forward. His results showed that in dry air the velocities in cms. per second per volt per cm. were 1.36 for the positive ion and 1.87 for the negative ion, and found generally that the velocity of the negative ion was greater than that of the positive ion. See Sir J. J. Thomson, *Conduction of Electricity through Gases*, 1903; Rutherford, *Radio-Activity*, 1905; Lodge's *Electrons*.

Vacz (Ger. *Waitzer*), a tn. in Hungary, on the l. b. of the Danube, 25 m. N. of Pestb. V. is the seat of a bishopric, and has an episcopal school, a gymnasium, and a school for deaf mutes. Pop. 18,000.

Vadstena, or *Wadstena*, a tn. of Sweden on the E. shore of Lake Wetter, with a 16th-century castle. It is a centre of the lace-making industry. Pop. 2548.

Vaga, *Perino Del*, or more properly, *Pietro Buonaccorsi* (1500-47), an Italian painter, born in Florence. He helped Raphael in the frescoes of the Vatican at Rome, and after his death went to Genoa and founded a school of painting. The 'Creation of Eve' in the church of Marcellio in Rome is a good example of his work.

Vagabond, see **VAGRANTS**.

Vagrants. Under the comprehensive term V., the law includes a vast number of petty offenders or persons suspected of contemplating the commission of some offence, there being practically nothing in the shape of a common factor underlying the various types of V. The whole law is now to be found in the Vagrancy Act, 1824, and the different amending Acts. Under these Acts V. are classified into: (1) Idiot and disorderly persons, (2) rogues and vagabonds, and (3) incorrigible rogues. The first category are the following: persons who fraudulently apply at a workhouse or to any Poor Law officer for relief (having at the time property in their possession or control without making a complete disclosure of such property to the overseer or relieving officer); prostitutes behaving indecently in places of public resort; persons who although able to maintain themselves or their family by work or other means wilfully neglect to do so, thereby becoming or causing his dependents to become chargeable to the parish; pedlars trading without a licence; persons

wandering abroad or loafing about any public place, street, court, or passage to beg alms, or causing or encouraging any child to do so; persons returning to and becoming chargeable to any parish from which they have been legally removed under an order of justices except with a certificate of an overseer acknowledging them to be settled in another parish (see under POOR LAWS); and women who neglect to maintain a bastard child when able wholly or in part to do so. The punishment of idle and disorderly persons is imprisonment, if committed by one justice, for a term not exceeding fourteen days with hard labour, or, if committed by two justices, one month, or as an alternative a fine not exceeding £5 (but hard labour must not be awarded for default of payment). In the class of rogues and vagabonds are included persons convicted for a second time of an offence which if it had been the first occasion would have constituted them idle and disorderly persons; fortune tellers; persons wandering about and lodging in barns, out-houses, or other deserted buildings, or in the open air, without visible means of subsistence and without giving a good account of themselves; persons exposing to view in any shop, road, or public place, any obscene print or picture; persons obscenely and wilfully exposing their persons in a public place; persons who endeavour by the exposure of wounds or deformities to obtain alms, or who in any way by false pretences try to get charitable contributions; persons running away and leaving a wife or child chargeable to a parish (this apparently includes only *legitimate* children); women convicted of a second offence of neglecting to maintain their bastard children whereby such children become chargeable to a parish; persons gaming in a public place (including a railway carriage); male persons living on the earnings of prostitutes; persons who persistently solicit in any public place for immoral purposes; persons who make false confessions of desertions from the navy, or false statements in order to get into the navy; persons armed with offensive weapons with intent to commit felony; persons found in any dwelling-house, stable, enclosed garden, or yard for any unlawful purpose (this means for the purpose of committing some offence which would, if effected, render the offender liable to a criminal prosecution, and not an act of mere immorality); reputed thieves or frequenting any river, canal, street, or highway with intent to commit a felony; and persons

committing offences under the Aliens Act, 1905. The punishment of rogues and vagabonds is either fourteen days' imprisonment with hard labour or three months' imprisonment, according to whether the conviction is before one or two justices, or a fine of £25. The class of incorrigible rogues includes persons convicted a second time as rogues and vagabonds, and V. breaking out of legal confinement. The punishment may extend to one year's imprisonment to which whipping (in the case of males) may be superadded. Offenders included in Classes I. and II. may appeal to Quarter Sessions. Offenders of Class III. may appeal from Quarter Sessions to the Court of Criminal Appeal.

Vahl, Martin (1749-1804), a Norwegian botanist, born at Bergen. He studied under Linnæus, and, having spent some time in travel in Europe and Africa, became professor of natural history and later professor of botany and inspector of the botanical garden at Copenhagen. He wrote: *Eclogæ Americane*, 1796-1807; *Flora Danica*, parts xvi. to xxi.; and *Enumeratis Plantarum*.

Vaillant, François de, see LEVAILLANT, FRANÇOIS.

Vaillant, Jean Foy- (1632-1706), a French

numismatist. He was a member of the Académie des Sciences, and published *Numismata Imperatorum Romanorum Præstantiora*, 1674; and *Numismata*, 1680.

Vaillant, Étienne (1732-1800), a French botanist. He was a member of the Académie des Sciences, and then a surgeon, he ultimately became director of the Jardin des Plantes, 1708. His great work is *Botanicon Parisiense*, pub. 1727.

Vaishnavism, a sect of the Hindu religion, named after the Hindu deity Vishnu, who is worshipped as the supreme God over the

other gods of the Trimurti.

Vaisyas, in the Sanskrit designation, the members of the third caste as distinguished from the Brahmans or Kshatriyas or warriors.

Vajda-Hunyad, a town with a magistracy in Hungary, 81 m. from Temesvár. Pop. 4400.

Valabhacharya, an Indian sect, named after its founder Valabha, a Telugu Brahman of the 15th and 16th centuries, who gave himself out to be an incarnation of Krishna, and died at Benares.

Valais (Ger. *Wallis*), a canton of Switzerland, stretching from Mt. St. Gothard to Balme. The canton is French, German, and Italian, and spoken by the inhabit-

ants. It is one of the most picturesque cantons of Switzerland.

Valckenaer, Jan (1759-1821), a Dutch diplomatist, the son of Lodewyk Kaspar (1715-85). He was envoy to Madrid (1796-1801), and was sent by Louis Bonaparte to make a last effort to prevent the union of Holland with France (1810). He was also for a time professor of jurisprudence at Franeker.

Valckenaer, Lodewyk Kaspar (1715-85), a philologist and critic, born at Leeuwarden, Holland. He became professor of Greek literature and antiquities at Franeker, 1741, and in 1766 at Leyden. He edited many Greek texts.

Valdenses, see WALDENSES.

Valdepeñas, a tn. of Spain in the prov. of Ciudad Real, noted for its red wines. Pop. 21,200.

Valdes, Armando Palacio, see PALACIO VALDES, ARMANDO.

Valdes, Juan de (c. 1500-44), a Spanish reformer, born at Cuenca. His brother being imperial secretary of state, he obtained the post of secretary to Charles V. of Germany, and afterwards acted in the same capacity to the viceroy in Naples. While there he attempted to bring about the regeneration of the Church, but though not a Lutheran and not in the least opposed to Catholic doctrine, he was hated by the Romanists. He wrote *Spiritual Milk; The Christian Alphabet*; and commentaries on the N.T.

Val de Travers, a valley of Switzerland in the Jura Alps, 13 m. S.W. of Neuchâtel. The well-known cement is named after it.

Valdivia, the southernmost prov. of the republic of Chile, which, despite the efforts of the government towards encouraging immigration, is not very well populated. The province of V. is richly stocked with forests, and the export of various kinds of timber is one of the principal industries. Means of communication are not good. The capital, Valdivia, a commercial port on the Valdivia R., was founded in 1551 by Pedro Valdivia, the conqueror of Chilo.

Valdivia, Pedro de (c. 1510-69), a Spanish soldier, distinguished himself in the conquest of Venezuela (1535), and was later entrusted with the subjugation of Chilo, where after defeating the Indians he founded Santiago (1541). He was captured and put to death by the Indians during a revolt at La Concepcion, which he also founded.

Valdesta, a city of Georgia, U.S.A., 156 m. S.W. of Savannah, on the Atlantic coast. It is the port for the local cotton and fruit trade. Pop. 7656.

Valence, a tn. of France, cap. of the dept. of Drôme, in a fertile plain, on the l. b. of the Rhone, 65 m. S. of Lyons. It has a fine old cathedral, and manufs. of silk, cotton goods, gloves, leather, etc. Pop. (com.) 28,000.

Valencia, a maritime prov. of E. Spain. The surface is much diversified, being low and level along the coast, but rugged in the interior. The soil is rich, and rice, wine, oil, and mulberries are produced. Area 4150 sq. m. Pop. 852,930. Its capital is Valencia, on the Guadalaviar, 3 m. above its mouth. V. is an ancient city, which has undergone extensive alterations in modern times. Its flourishing university was founded in 1410. There are manufs. of coloured textiles, hats, leather, paper, etc. Pop. 215,000.

Valencia, a tn. of Venezuela, 80 m. W.S.W. of Caraccas, near the W. shore of the Lake of Valencia. It is a well-built city, situated in a fertile district. Pop. 40,000.

Valencia de Alcantara, a tn. in the prov. of Caeceres, Spain, in the middle of a farming district. It is a considerable customs centre. Pop. 9500.

Valenciennes (Lat. *Valentianæ*), a tn. in the N. of France, 40 m. S.E. of Lille. Pop. 317,000. V. is a fortified city of the first class, with several fine churches and a Jesuit college dating from the 17th century. It is celebrated as the birthplace of Froissart and Watteau. Trade is mostly in oil, sugar, chicory, chemicals, etc.

Valency. When chlorine combines with hydrogen, one atom only of each element enters into combination. With oxygen, two atoms of hydrogen combine, and for combination with nitrogen and carbon three and four atoms are required respectively. One atom of chlorine never combines with more than one atom of hydrogen, and its affinity is satisfied or saturated by the union with one atom. The atom of oxygen requires two atoms of hydrogen to be saturated, nitrogen three, and carbon four atoms. This combining power of the elements is known as their 'V.', and the elements themselves are termed *mono*-, *di*-, *tri*, and *tetravalent*, according to the number of hydrogen atoms with which they can unite. The metals, as a rule, do not combine directly with hydrogen, and their V. is therefore determined by the number of hydrogen atoms they can replace. Measured by their combining capacity for hydrogen or chlorine (another monad), elements do not always exhibit the same valency. Thus one atom of phosphorus is satisfied with three atoms of hydrogen, but can com-

bine with five atoms of chlorine. It is, however, generally accepted that the highest number of monad elements with which one atom of an element combines is the V. of that element. Thus phosphorus is regarded as a pentavalent element. When an element can combine with only one monovalent atom, it is said to have one 'affinity.' Phosphorus is a pentavalent element, i.e. it has five affinities. In the compound PH_5 , it has three affinities satisfied and two unsatisfied, and therefore compounds of this type are termed unsaturated compounds. The V. of an element is therefore often a variable quantity, and, in many cases, dependent upon temperature and pressure. Thus if the compound PH_3 (phosphine) be mixed with hydrochloric acid (HCl) and the mixture subjected to pressure, a crystalline compound, phosphonium chloride, (PH_4Cl), is formed in which the phosphorus atom is pentavalent. Where, in a compound, an atom is not functioning in its highest recognised V., there is a tendency for the compound to unite with additional atoms to form new compounds. Thus carbon monoxide (CO), in which the carbon (a tetrad) is apparently functioning as a divalent element, unites with an atom of oxygen to form carbon dioxide (CO_2), where carbon functions as a tetrad. In some cases, molecules of different compounds, in which all the atoms are fully satisfied, unite to form other compounds. Thus hydrogen fluoride and potassium fluoride combine to form the compound hydrogen-potassium-fluoride ($\text{HF} + \text{KF} = \text{KHF}_2$). No precise explanation can be given regarding these compounds, and they are often termed 'molecular combinations.' For theory of V. see any advanced text-book of chemistry, e.g. *Rescey and Schorlemmer*; see also CHEMISTRY.

Valens, Aburnus, a jurist who flourished under Antoninus Pius. He is excerpted in the *Digest*.

Valens, Fabius, one of the principal generals of the Emperor Viteillus, for whom in 69 A.D. he won the battle of Bedriacum, which secured the sovereignty of Italy. As consul he remained faithful to the emperor, but was taken prisoner when Vespasian invaded Italy, and put to death.

Valens, Flavius, was emperor of the East (364-378 A.D.). He was the brother of Valentinian I., and was born about 328. His reign marks the decline of the Roman power, for during it the Goths were admitted into the countries S. of the Danube. It was also characterised by the contests between the Catholics and Arians.

Valentia, or Valencia, a small island

off the S.W. coast of Ireland, where there are several cable and signalling stations, and a small harbour. V. is also important as a meteorological centre.

Valentine, Basil, the name given to a German alchemist who flourished at the end of the 15th century. *The Triumphal Chariot of Antimony*, trans. in 1661, and *Halegraphia*, are works of his hands.

Valentine, Saint, a bishop and martyr of Rome who suffered death probably during the persecution under Claudius II. in 270. St. Valentine's festival falls on Feb. 14, and the name is very popular in England; but notwithstanding this, apparently no church has been dedicated to him. The custom of sending valentines probably had its origin in a heathen practice connected with the worship of Juno; its association with the saint is wholly accidental.

Valentine and Orson, known to mediæval romance as the sons of the Emperor of Greece, fortuitously connected with the Charlemagne romances. Their story is of folk-lore origin, being based on the common folk-lore legend of a man reared by a bear (Orson = Oursson = bear's son). Versions exist in many languages. A chap-book dealing with them was published in Glasgow as late as 1850.

Valentinian, the name of three Roman emperors: *Valentinian I., Flavius* (364-375 A.D.). The frontiers of the empire were exposed to great danger during his reign. Through his general, Jovinus, he gained a victory over the Alemanni in 366 A.D. In 368 A.D. the Alemanni renewed their attacks upon Eastern Gaul, but V. drove them back. This emperor was a man of ability and a wise administrator. *Valentinian II., Flavius* (375-392 A.D.), son of Valentinian I. He was at first an Arian, but later abandoned this heresy. *Valentinian III.* (425-455 A.D.), son of Valentinian I., reigned in Africa and was overthrown by the Vandals.

Valentinus, one of the most famous of the Christian Gnostics, was a native of Egypt. He was educated at Alexandria, but went to Rome about 140 A.D., and remained there through the times of Pius to the episcopate of Anicetus. He found many adherents (*Valentinians*), especially in the East, and persevered in propagating his doctrines, notwithstanding the censures of the church. His system recognised a series of forms of manifestation of the hidden being of God: the Demiurgus, or dependent divinity; and the Soter, or Redeemer, whom he regarded as being united with the personal being of Jesus Christ. In

addition to this he names the primal Essence the Bythos.

Valenza, a tn. of Italy in the prov. and 7 m. N. of Alessandria, on the R. Po, with silk and jewellery manufs. Pop. 11,000.

Valera y Alcalá-Galiano, Juan (1824-1905), a Spanish politician and writer. He entered upon a diplomatic career (1847), serving at Naples, Lishon, St. Petersburg, and elsewhere. Returning to Madrid (1858), he contributed largely to Alharada's Liberal opposition journal, *El Contemporáneo* (1859). He held various high posts later, becoming Director of Public Instruction (1868), ambassador to Lisbon (1881-83), Washington (1885), and Vienna (1893-95). His most famous works are his novels, including: *Pepita Jemenez*, 1874; *Las Ilusiones del Doctor Faustino*, 1875; *Doña Luz*, 1879. V. also wrote short tales: *El pajar verde*, the *Parsonades*; poetry; and critical works, such as *Disertaciones y juicios literarios*, 1882; *Estudios críticos* (2nd ed., 1884); *Ecos argentinos*, 1901. See Brunetiere on 'Juan Valera' in *Hist. et Littérature*, i., 1884.

Valerian, or Publius Licinius Valerianus, Roman Emperor 253-60 A.D., a Roman general and faithful supporter of Gallus, after whose death he was elected emperor by the soldiers. V. took his son Gallienus as colleague, and, leaving him in charge of affairs in Europe, himself set out for the East to crush the Persian Sapor I. (257). After some success he was entrapped by Sapor and imprisoned till his death. See Pollio's *Life of Valerian*; Aurelius Victor's *Cæsares*.

Valerian (*Valeriana*), a genus of plants and shrubs with cymes of pink or white flowers. *V. mikanii* (or *officinalis*), the great wild V., is a tall plant with pinnate leaves. The root is highly attractive to cats, and is used medicinally.

Valerianaceæ, a small natural order of annual or perennial plants, many of which are fragrant. One of the most remarkable species is *Nardostachys jatamansi*, the spikenard of Scripture, a native of India.

Valeric or Valerianic Acid (C_8H_8COOH), the name given to the mixture of acids obtained by distilling the macerated plants valerian or angelica with water. It is an oily liquid with an unpleasant smell (boiling point, $174^\circ C.$). There are four isomerides with this molecular formula, of which isovaleric or isopropylacetic acid, and optically active valeric or methylethylacetic acid are the most important.

Valerius Flaccus, see FLACCUS.

Valerius Maximus, a Roman historian of Tiberius's reign; a friend of Sextus Pompeius, whom he accom-

panied to the East (27 A.D.). His *Factorum et Dictorum Memorabilium Libri IX.* is interesting as a specimen of the transition from classical to 'silver' Latin. There are editions by Halm (1865), Kempf (2nd ed. 1888), Smith (selections with English notes, 1895). See Vossius, *De Historicis Latinis*; Speed's English trans. (1678).

Valerius, Probus Marcus (or M. V. Probus), a noted grammarian and critic of Nero's reign, a native of Berytus, Syria. A commentary on Virgil's *Eclogues* and *Georgics* bears his name, and is often quoted by Servius. V. also wrote a criticism and biography of Persius, and *De Notis*. See Kübler, *De Probi Comment. Verg.*, 1881; Steub, *De Probi Grammaticis*, 1871.

Valetta, or La Valetta, the cap. and seaport of Malta, on the N.E. coast, headquarters of the British fleet in the Mediterranean and an important coaling station. Its strong fortifications were partly built by the Knights of St. John after 1530; the city being founded, 1566, between Great and Quarantine ports. It became a British possession in 1801. V. has considerable transit trade, and manufs. silk. Pop. 62,000.

Valette, Jean Parisot de la (1494-1568), grand master of the Knights of St. John of Jerusalem at Malta (1557), and founder of Valetta (1566). He was noted for his successes against the Turks, particularly for his defence of Malta against the Sultan Solymán (1565). See Mermet, *Eloge*, 1803; Pfaff, *Philippe Villiers et J. de la Valette*, 1851; De Thou, *Hist. sui Temporis*; Vertot, *Hist. des Chevaliers de Malte*.

Valguarnera, a tn. of Sicily, in the prov. of Caltanissetta, 18 m. E. thereof. Pop. 14,000.

Valhalla, the German 'Pantheon,' a building at Donaustauf near Ratisbon, erected by Ludwig I. of Bavaria between 1830 and 1842 in honour of the great men of Germany.

Valhalla, or Walhalla, in old Norse or Scandinavian mythology, the abode of Odin in Asgard. Originally the realm of the dead, it came to be regarded in the Viking age as the home of departed warriors, who spent their days fighting and feasting. See the Greek ELYSIUM.

Valk, a tn. of Russia, in the gov. of Livonia, 90 m. N.E. of Riga. Pop. 10,500.

Valkyries, Valkyrs, or Walküre, in Scandinavian mythology, Odin's hand of beautiful handmaidens, generally said to be nine in number. After every battle they were sent forth to choose which of the slain should be conducted to Valhalla. They also served at the banquets there. Odin's

daughter, Brunhild, is one of them. For her story see Wagner's 'Die Walküre,' from *Der Ring des Nibelungen*.

Valla, Lorenzo, or Laurentius (c. 1407-57), an eminent classical scholar and controversial writer, said to have been saved from the Inquisition by his patron, King Alfonso V., who contrived his escape to Rome, where he became secretary to Pope Nicholas V. He taught successively at Pavia, Milan, and Naples; and was the author of *Annotationes in Novum Testamentum*, *De Elegantia Latinæ Linguae*, and Latin translations of Herodotus and Thucydides. See J. A. Symonds, *Renaissance in Italy*, 1897-99; Mancini's *Vita* (Florence), 1891.

Valladolid: 1. A prov. of Old Castile, Spain, 2922 sq. m. in area, including part of the Douro valley. It is largely agricultural, hence called 'granary of the Peninsula.' Fruits, wines, oil, madder, honey, and wax are produced. Pop. 283,394. 2. Cap. of above, and formerly of all Spain, at the confluence of the Pisuerga and the Esguena, 100 m. from Madrid. Among its chief buildings are the cathedral (1585), the museum, and university (1346). Destroyed by fire (1561), the city was rebuilt under Philip II. Columbus died here (1506), and the house occupied by Cervantes (1603-6) is owned by the state. The Northern Railway has works at V. Pop. 67,742. 3. A tn. of Yucatan, Mexico, 90 m. S.E. of Merida. Its cat convent were (1848). It has

cotton manufs. Pop. 14,000. 4. A coast-pueblo of W. Negros prov., Negros, Philippine Is., on Guimaras Strait. Pop. 10,500.

Vallauri, Tommaso (1805-97), an Italian scholar and historian, professor of Latin eloquence at Turin (1843). He published editions of Plautus, Horace, Sallust, and others; *Hist. of Poetry in Piedmont*, 1841; *Hist. of the Royal House of Savoy*, 1845; a *Latin-Italian Dict.*, 1852-54, and other works. See his *Autobiography*, 1879.

Valle, Pietro della, surnamed Il Pellagrino (1586-1652), an Italian traveller in the East, who set out as a pilgrim for Palestine and the adjacent countries (1614). He also visited Persia (1617), finally returning to Rome (1626). His *Travels in India and Persia* were published in 1658-63, and translated into English in 1665. See Biondi's *Vita*, 1622.

Vallejo, a tn. of Solano co., California, U.S.A., on San Pablo Bay (N.E.), 30 m. N.E. of San Francisco. It has shipyards and iron foundries; while Mare Is. opposite is the headquarters of the United States Pacific

Naval Squadron, with a navy yard, arsenal, dry docks, and a lighthouse. Pop. (1910) 11,340.

Valley. Just as mountain ranges and masses result from the great uplifts of the earth's crust by weathering, so great depressions exist between such uplifts. They are usually, however, too extensive to be noted except in maps; when they are sufficiently small to be a prominent feature, they are *synclinal* Vs. Where, too, the region between two more or less parallel faults has gradually subsided, *rift* Vs. are formed. The Lowlands of Scotland, the Ghor or Jordan V. are examples. *Submerged rift* Vs. are occupied by the Adriatic and Red Seas, many lakes being also formed in this way. Where the broken upturned strata of the earth's crust form ranges of mountains (*q.v.*), *longitudinal* Vs. are formed by the more rapid denudation of the softer rocks. All these types are determined by geological changes resulting from crystal movement in the earth, the features being softened only by long-continued weathering. In dry climates they are most marked, and the great *inland drainage areas* of Australia, Central Asia, and N. America may be considered as huge Vs. of this kind. Surface geological features are generally completely marked by the incessant operation of radiant forces from the sun, and the consequent atmospheric changes; the surface of the earth is 'weathered,' and most deeply by water and moving ice. Land

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weathering can leave them as barriers. River Vs. are thus formed across the strike, and *transverse* Vs. When quit as *river-gaps*.

are narrow and deep, forming ravines or gorges which depend for their other features on the intensity of weathering. They form very striking scenery in dry regions, particularly when the strata are horizontal. The cañons of Colorado are terraced erosion Vs. *River* Vs. have forms varying with the course and stage in the life-history of the eroding streams. The effort of erosion and weather alone has a powerful effect in forming the shape of the river V. Curves depend on the nature of the soil through which the river meanders; the floor of the river beds also depends on the nature of the

soil—glacial action having the effect of widening the bottom, while the deposition of alluvium builds up a raised floor. *Rias* and *fjords* are submerged or drowned Vs. *Handing* Vs. are formed by tributary streams of less eroding power than the stream responsible for the main V., they enter its sides at a level above the banks of the main V. from reg. flowing. these Vs.

sions are considered to be due to the gradual removal of underground material by solution due to ground water with a definite direction of seepage, or to be more defined underground streams. *Glaciated* Vs. occur in high mountains and regions of perpetual snow; they are carved by the moving ice streams, and differ from river Vs. in having a U-section, with steeper banks, usually rocky and precipitous. Ancient Vs. of this type, but weathered out of typical form, are found in N. America and Europe as relics of the glacial age; they often contain moraine-dammed lakes. Vs. are natural communications and highways, and, when extensive, the homes of civilisation. Egypt was the lower Nile valley and delta. Mesopotamia and the Tigris and Euphrates Vs. gave rise to three typical communities, Chaldea, Babylonia, and Assyria. The first, in the lowest part of the valley, was typically agricultural; the second, in the middle region, had broader and more vigorous pursuits, including both agriculture and pasture; the last was more truly pastoral, of narrower pursuits but hardy. The influence of the home is in each case reflected in the civilisation of the community, and the same stages are marked in most Vs. See J. Geikie, *Earth Sculpture*, 1898; J. E. Marr, *Scientific Study of Scenery*, 1900; also the bibliography under MOUNTAINS and RIVERS.

Valleyfield, a tn. of Quebec, Canada, in Beauharnois co., on the R. St. Lawrence, at the upper end of Beauharnois Canal, 36 m. W.S.W. of Montreal. There are cotton, woollen, flour, and saw mills, etc. Pop. 12,600.

Vallisneri, or Vallisneri, Antonio (1661-1730), an Italian naturalist, pupil of Malpighi at Bologna. He practised medicine at Reggio (1688), becoming professor of practical medicine and natural history at Padua (1700). His chief work, *Istoria della Generazione dell' Uomo e degli Animali* (1721), won him Buffon's praise. Vallisneria is named after him. See Tipaldo, *Biographia degli Italiani Illustri*.

Vallisneria, or *Spiralis* Eel Grass, an

aquatic plant (order Hydrocharitaceae) often grown in aquaria. The flowers are unisexual, the male flowers being borne at the base of the plants, whence they are liberated to float on the surface. As they pass, the female flower is elevated on its spiral peduncle, and after fertilisation the stalk again contracts.

Vallombrosa, a Benedictine convent in Vallombrosa Valley, 16 m. E. of Florence, Italy, founded by St. Gualbert (c. 1038). The present building dates from 1637. The abbey was suppressed and became a school of forestry after 1869. It is mentioned in Ariosto's *Orlando Furioso* and Milton's *Paradise Lost*.

Valloia, or Scarborough Lily, a genus of bulbous plants (order Amarillidaceae) bearing handsome scarlet flowers. *V. purpurea* and its varieties are commonly grown in greenhouses.

Valls, a tn. of Spain and cap. of the dist. Valls, in the prov. of Tarragona, with manufs. of textiles and paper. Pop. 13,000.

Valmy, a vil. of Marne dept., France, 6 m. from Ste. Menchould. A pyramid (1819) on a hill in the S. commemorates the victory of the French Revolutionists under Kellermann and Dumouriez over the Prussians (1792). Pop. 500.

Valois, Adrien de (Adrianus Valesius) (1607-92), younger brother of Henri de Valois. From 1646-58 he published his great historical work of France, under the title *Gesta Francorum, seu de Rebus Francicis*. This work comprises the history of France from 254-752 A.D.

Valois, Charles de, see ANGOULÊME, CHARLES DE VALOIS, DUKE OF.

Valois, Henri de (Henricus Valesius) (1603-76), a French scholar and royal historiographer. In 1622 he went to Bourges to study jurisprudence, and after the completion of his studies he practised for several years as a lawyer. His chief work is a new edition of the Greek writers on ecclesiastical history.

Valois, House of, a French dynasty, ruling 1328-1498 and beginning with Philip VI. (1328-50). Next came John (1350-64) and Charles V. (1364-80), under whom France suffered severely in the war with England. She was defeated at Crecy and Poitiers (1346 and 1356), and John was taken prisoner to London. The state was reduced to bankruptcy, the nobility grew rebellious, the people almost barbarous. Charles VI. (1380-1422) was defeated by Henry V. at Agincourt (1415). France was saved by Joan of Arc, who had Charles VII. (1422-61) crowned at Rheims. He instituted a special tax for a regular

army. His successor, Louis XI. (1461-83), kept down the nobles; and recovered Maine, Anjou, and Provence, and part of Burgundy. Charles VIII. (1483-98) secured Brittany by his marriage with Anne of Brittany. He had no son, and the crown passed to Louis of Orleans (XII.), the first of the Valois-Orleans house.

Valparaiso: 1. The name of a prov. and its cap. in Chile, S. America. The prov. has an area of 1953 sq. m. It is mountainous and somewhat barren, but cereals are grown. Pop. 299,466. The town is a seaport on the Pacific, in communication by rail with Buenos Ayres, and some 66 m. N.W. of Santiago. There are regular steamship services to Europe and the States; whilst breweries, foundries, and machinery and railway workshops account for its busy industrial life. Copper, nitrate, silver, and wheat are exported. Dirty, unprepossessing streets, to say nothing of earthquakes, belie its name ('Paradise Valley'). £3,000,000 is to be spent on the construction of a dock and harbour. Pop. 179,815. 2. A university tn. and the cap. of Porter co., in Indiana, U.S.A. It lies 38 m. S.E. of Chicago. Pop. (1910) 6987.

Valpy, Richard (1754-1836), an English schoolmaster, born in Jersey. Took orders in 1777, and was headmaster of Reading Grammar School (1781-1830). His Greek and Latin grammars attained a wide reputation. His brother, Edward (1764-1832), and his son, Abraham John (1787-1854), were classical scholars.

Vals-les-Bains, a vil. and spa in the canton of Aubenas, Franco. Its waters have similar properties to those of Vichy. Pop. 4352.

Valtellina, the valley of the Upper Adda, prov. of Sondrio, N. Italy. It is generally held to include the Liro or San Giacomo Valley, and extends to Lake Como (44 m.).

Valuation, see APPRAISEMENT, DOMESDAY BOOK, EXTENT, TAX, RATING.

Value, in political economy, the quantity of labour, or of the product of labour, which will exchange for a given quantity of labour, or of some other product thereof. *Utility* must be distinguished from *V.*, or, in Adam Smith's phraseology, *value in use* from *value in exchange*. Water, being indispensable to existence, has a very high degree of utility or of *V.* in use, but as it can generally be obtained in large quantities without much labour or exertion, it has but a low *V.* in exchange. Diamonds, on the other hand, which exist only in limited quantities and require extraordinary labour in production, are of compara-

tively little or no utility, but of enormous exchange *V.*

Valves are the two parts into which the pericarp of pods splits open along defined lines to liberate the seeds.

Valves. Mechanical contrivances for regulating the movement of fluids along pipes. The *flap V.* is one of the most common, worked by the pressure of the fluid itself. A special seating is provided in the pipe, and the flap is simply a hinged metal door opening and closing on this. It is faced with leather, rubber, or such material which will make the closing fluid-tight. The double form is known as the *butterfly V.* In both cases a guard is arranged to prevent excessive opening. This type is suitable only for low pressure and slow 'beat,' e.g. in the case of hand suction pumps. The *poppet*, or mushroom *V.* is not hinged. Usually circular in form, it lifts bodily from its seating, and some form of guide is arranged to ensure true working. The seating and the fitting end of the poppet are generally worked into conical form which gives a better fit and some self-adjustment to wearing due to friction. In addition three flanges are usually cast on the end fitting the orifice. An arrangement is provided to prevent too great a jump; this may be merely a metal guard, or rubber rings working against a fixture above, or a spring of adjusted power; in which two last cases the *V.* may be lighter, not closing by its own weight. Such *V.* are suitable for higher speeds and pressures which would rapidly throw a hinge out of action. There is, however, the difficulty of shock to be met, partly by reduction of weight of moving parts, partly by reducing the area of contact, and partly by reducing the lift. By providing a double seating, as in the *double beat V.*, half the lift only is required. *Four-beat V.* are used for powerful engines at extension of this principle. In the *Pulsometer* (see *PUMPS*) and other high-speed engines a ball is used as a *V.* For air pumps, *V.* of rubber are generally used. Stop *V.* for opening and closing a port at will are often operated by hand; in this case the *V.* is attached to a spindle which raises or lowers it by means of a screw thread, the *V.* not turning with the screw; it is practically a hand-operated poppet *V.* To avoid the evils of varying boiler pressure, reducing *V.* are employed. Reid's *V.* is an example. The entering steam passes by the valve, closed by a spring to the throttle valve, which it lifts, and then acts on the piston. The steam can then pass through at lower pressure; it further acts through a coiled pipe on a dia-

phragm, above the steam chamber, thus operating a lever and partially closing the steam pipe if the pressure is too great. Cocks are a form of V. usually operated by hand; a seating is provided in the pipe into which a conical plug is inserted. Through this is drilled a hole which by the turning of the plug can be made to continue the passage of the pipe through the plug, or lie across the passage, and interrupt the flow of fluid. They are used in water pipes in houses, but are not suited for rapid working at great pressures, as the suddenness of action gives rise to too great shock.

Safety valves are attached to boilers or other vessels where the fluid contents may reach a pressure great enough to cause bursting. The *dead-weight safety V.* has a spherical V. fixed to a cover piece which can be loaded with weights. These are adjusted so that the V., the shape of which prevents sticking, will lift if pressure through the pipe becomes too great. There is good stability owing to the low centre of gravity. The *lever safety V.* has a conical V., the pressure on which is adjustable by means of a weight acting at the end of a lever. The moment steam escapes its lifting force varies in a manner differing with the shape of the V. and opening; usually the lift required to keep the passage open is greater than that required to open it, and it would be better if load diminished with opening. The use of springs intensifies this difficulty. In marine safety V. two or three are placed on the same V. box so as to produce more opening for the lift. Long springs are used and so adjusted that an opening of not more than 1 in. will be necessary, thus reducing the increased load. On locomotives springs are always used, the 'Ramsbottom' being very largely used. Both V. are operated simultaneously by the spring acting on the lever. The fulcrum by its position ensures the lessening of the load if the V. lifts. The extension of the lever provides a means whereby the engine-driver may test either V. for sticking or obstruction. The 'Naylor' contrivance is largely used for spring safety V. The V. is pressed on its seat by means of a spring acting through a bent lever so arranged that the opening of the V. and pressure on the spring alter the leverage, thus not increasing the load. The *low-water safety V.* used on stationary engines is loaded directly by a spindle with a weight, but negatively by a weight acted on by a float through a lever. If water is too low the float increases in weight and reduces the load on the V. so that steam

blows off. There are various ways of arranging that a V. shall not close until pressure is sufficiently relieved; one of the simplest is by shaping the periphery of the V. so that it forms an overhanging lip over the orifice; the steam acting on this lengthens the period of lift.

Vambéry, Armin (1832-1913), a Hungarian Orientalist and traveller, born at Duna-Szerdahly, on an island in the Danube. He became a schoolmaster; and acquired a wide knowledge of European, Turkish, and Arabic tongues. Between 1862 and 1864, disguised as a dervish, he penetrated to Khiva, Bokhara, and Samarkand. He visited London and Paris, and finally was appointed professor of Oriental languages at Budapest. He has published: *Travels in Central Asia*, 1865; *Sketches of Central Asia*, 1867; an *Autobiography*, 1883; *Western Culture in Eastern Lands*, 1906; *Coming Struggle for India*, 1885; *Hungary*, 1887; *Central Asia and the Anglo-Russian Frontier Question*.

Vampire, a monster which figures largely in the black superstitions of Russia, Servia, and Poland; and which, with slight modifications, darkens the folklore of many peoples. It is primarily the spirit of a dead man, which, leaving the grave by night, sucks the life-blood of sleepers till they waste away and die. Wizards, witches, suicides, and werewolves are especially prone to become Vs.

Vampire Bats, which are true blood-suckers, are found in South America, and belong to the genus *Desmodus* in the family Vespertilionidae. They are small creatures, and suck the blood of man, cattle, and horses. The bats which are found in the genus *Vampyrus* feed on fruit and insects, and have no share in the dietary of *Desmodus*.

Van, a tn. of Turkey in Asia on the eastern shore of Lake Van. V. has a considerable trade in corn and rice. The town is prosperous and has good cafés, schools, and bazaars. It is supposed to have been a place of residence of Semiramis. There are many antiquities and cuneiform inscriptions.

Van Achen, Hans (1562-1615), a German historical and portrait painter, born at Cologne. He settled at Munich in 1590, becoming court painter to William V.; and at Prague in 1601, becoming court painter to Matthias I. in 1612.

Vanadium (symbol V; at. wt. 51.2), a rare metal found in the minerals vanadite (lead vanadate), pucherite (bismuth vanadate) and mottramite (lead-copper vanadate). The element is prepared by heating the dichloride

in a stream of puro hydrogen. It is a greyish metal with a high melting-point (about 1700° C.) and has been used in making hard steels. Vanadium forms five oxides, corresponding to the oxides of nitrogen; and three chlorides. The pentoxido, formed by burning the metal in air, gives rise to the vanadates.

Van Beers, Jan (1821-88), a Belgian poet, taught Dutch language and literature in Malines, in Lierre, and from 1860 at the Athenæum in Antwerp. There is a warmth, simplicity, and vigour about his songs and ballads—*Jongelingsdroomen*, 1853; *Levensbeelden*, 1858; and *Rijzende Bladen*, 1883—which remind the reader of Longfellow.

Vanbrugh, Irene and Violet, English actresses, are daughters of the late Rev. R. H. Barnes. Both are leading actresses on the London stage. Miss Irene V. married Mr. Dion Boucicault in 1901, and Miss Violet V. married Mr. Arthur Bourchier in 1894.

Vanbrugh, Sir John (1664-1726), an English dramatist and architect, born in London, was controller of the Board of Works from 1702. He designed Castle Howard (1701) and the Haymarket Theatre (1705), and drew the designs for Blenheim Palace (1705). As early as 1696 his first play, *The Relapse*, was produced; and this was followed by many others, including *The Provoked Wife* (1697), *The False Friend* (1702), and *The Confederacy* (1705). His plays were witty, but marred by licentiousness. He was knighted in 1714.

Van Buren, Martin (1782-1862), an American statesman, born at Kinderhook, New York state, of Dutch descent. He devoted himself from early life to law and politics, and attached himself to the Democratic party, being elected to the U.S. Senate in 1821. He opposed the establishment of the state supported war with England and advocated the raising of the franchise. He warmly supported the candidature of General Jackson for the presidency in 1828, and his administration became severely governor of New York secretary of state of the Union,

Jackson as president. In the early days of his presidency were mainly occupied in setting the national finances in order, a task in which he met with only partial success owing to the opposition of Congress. His presidency was also troubled by disputes with England and a commercial crisis which involved the country in numerous loans. V. B. stood for the presidency

again, but without success, in 1844, 1848, and 1856, finally withdrawing his candidature in favour of Buchanan.

Van Ceulen, or Keulen, Ludolph (d. 1610), a Dutch mathematician, born at Hildesheim. He taught mathematics at Breda and subsequently at Amsterdam. His chief claim to fame is the great accuracy he attained in the expression by numbers of the ratio which the circumference of a circle bears to the diameter.

Vancouver: 1. The cap. of British Columbia. It is the terminus of the Canadian Pacific Railway, and a port of call for steamers to China, Japan, Australia, and San Francisco. The city possesses an opera house, Carnegie library, several hospitals, and the Vancouver College. It is a centre for the great lumber trade of the province. Pop. 185,600. 2. A town near Portland, Oregon, U.S.A. Pop. (1910) 9300.

Vancouver, George (1758-98), a British navigator, who accompanied Cook in his second (1772-74) and third (1776-80) voyages. In 1791-92 he was engaged in exploring the N.W. coast of N. America from 39° 27' N. to 52° 18' N., including the island which was named after him. A complete account of his voyage appeared in 1798.

Vancouver Island, an island on the Pacific coast of N. America, separated from the mainland of British Columbia, to which it belongs, by Queen Charlotte Sound and Georgia Strait. Gold, iron, copper, and coal are found. There are about 100 m. of railway belonging to the Canadian Pacific Railway Company.

Van Dale, Anton (1638-1708), a Dutch theologian and physician. He acted as preacher among the Mennonites until appointed physician to the

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Roman

In the days of Aurelian (271) as a Vandal wing to the army, and the famous Stilicho was Vandal by descent. Under Constantine I. (330) they made a home in Pannonia, many adopting the Arian Christianity which Ulfilas had taught. About 406 they began to swarm into Gaul: and their restlessness soon drove them across the Pyrenees to Spain, where, after much bloodshed, they settled down with the Alans in Andalusia ('Vandalitia').

At the rash bidding of Boniface, Count of Africa, they landed en masse (possibly 80,000) on African shores (429), and having possessed themselves of Hippo (431) and Carthago (439) were soon masters of the whole province. Availing himself of the tumult consequent on the murders of Ætius and the Emperor Valentinian III., Gaiseric (or Genseric), the Vandal leader, appeared with his formidable array before the gates of Rome (455), and, having formally occupied that city, proceeded to carry out a systematic plunder before the very eyes of the helpless Romans. But retribution was soon to follow the remorseless persecutions of the Catholic Christians under Gaiseric and Hunneric, his son, the persistent ravages of Vandal pirates up and down the Mediterranean, and (above all, perhaps) that luxury, effeminacy, and sloth which had already undermined their pristine temperance and valour. In 534 King Gelimer, having suffered defeat at the hands of Justinian's general Belisarius, both at Ad Decimum and Tricamarum, finally acknowledged the supremacy of Rome, and thus brought to an abrupt conclusion the independent history of his tribe.

Vandamme, Dominique René (1770-1830), a French general, born at Cassel (dept. Nord). He entered the army in 1786, served under Napoleon in the Rhine campaign (1795) and at Austerlitz. In 1813 he was compelled to surrender at Kulm, and was treated with great harshness during his imprisonment. He fought for Napoleon during 'the hundred days' and was oxidized after Waterloo. See Du Casse, *Le Général Vandamme* (1870).

Vanderbilt, Cornelius (1794-1877), an American financier, born at Stapleton. Descended from Dutch ancestors exiled by religious persecution. Early showed commercial ability and gradually built up a large steamboat business round New York. In 1863 started speculating in railways with great success. Left an immense fortune to his children. W. H. Vanderbilt (1821-85), his son, born at New Brunswick. Commercially successful independently of his father; he helped later to organise some of his father's enterprises. Made large educational and charitable gifts during his life and by his will. W. H. Vanderbilt (1843-99), son of W. H. (*supra*); carried on his father's businesses, in which he was aided by W. K. Vanderbilt (b. 1849), his brother, who is the chief member of the family controlling the vast enterprises undertaken by the Vs., who are among the richest American millionaires.

Vanderdecken, see FLYING DUTCHMAN.

Van der Goes, Hugo, see GOES, HUGO VAN DER.

Van der Helst, Bartholomew (c. 1613-70), a Dutch portrait painter, pupil or imitator of Frans Hals. With Van Helst-Stokade he founded the guild of St. Luke. He sometimes painted sacred and mythological subjects.

Van der Heyden, Jan (1637-1712), a Dutch architectural and landscape painter, born at Gorinchem. He painted in partnership with Adrian van de Velde, who supplied the figures for his pictures.

Van der Meer, Jan (the Elder, 1628-91), a Dutch landscape painter, born in Haarlem. He was a pupil of Jacob de Wet, and excelled in his paintings of Holland. Jan van der Meer the Younger, 1656-1705), a Dutch landscape painter, born in Haarlem, son and pupil of the above.

Van der Meulen, Antony Francis (1634-90), a Flemish painter, born in Brussels. In 1666 he was called to Paris as battle-painter to Louis XIV., for whom he executed the campaigns of Flanders (1667). He was admitted to the French Academy in 1673.

Vandervelde, Emile (b. 1866), a Belgian socialist and politician, studied law at Brussels and was called to the bar in 1885. His chief energies, however, were devoted to the study of social questions, and in 1894 he was sent to represent Charleroi in the Chamber of Deputies. He has especially devoted himself to the land question and to the furthering of co-operation amongst workers. He has written several works both alone and in collaboration with others.

Van der Werff, Adrian (1659-1722), a Dutch historical, genre, and portrait painter, born near Amsterdam. In 1696 he was appointed court painter to the Elector Palatine, who knighted him in 1703. His brother, Pieter van der Werff (1665-1718), was his pupil and assistant.

Van de Velde, the name of three Dutch painters: Willem the Elder (c. 1611-93), was appointed naval painter to Charles II. of England (1657). Willem, the Younger (1633-1707), son of the above, whom he succeeded as marine painter to Charles II. (1679). Adrian (1639-72), animal and landscape painter, son of Willem Van de Velde, the Elder, was born and died at Amsterdam.

Vandianus, Joachim, alias Joachim van Watt (1484-1551), a Swiss scholar, born at St. Gall. He studied at Vienna, and after spending some time in travelling through Hungary, Poland,

Germany, and Italy, returned to Vienna and became professor. He wrote: *De Poetica et Carminis Ratione*, 1518; *Commentarii in Pomponium Melam*, 1518; *Scholia in Plinii Historium Naturalem*, 1534.

Van Diemen's Gulf, between Coburg Peninsula and Cape Hotham and Melville Is., N.W. Australia. It is 100 m. long by 60 m. broad.

Van Diemen's Land, see TASMANIA.

Van Dyck, Sir Anthony (1599-1641), a Flemish painter, was born in Antwerp, where in 1619 he opened a studio. His fame as a portrait-painter soon spread, and in the next year Lord Arundel invited him to come to England, where he was employed by James I. He went to Italy in 1621, and after four years' wandering, settled again in Antwerp, where he remained until 1632, when he came to London and was knighted by Charles I. Except for some months, he spent the remainder of his life in England. The king assigned V. D. a house in Blackfriars, and there he and the queen used to go from time to time to sit for their portraits, several of which were executed and are among the artist's masterpieces. He employed assistants, but always himself made the first sketch of each portrait, and gave each canvas its finishing touches.

Vane, Sir Henry (the Elder, 1539-1655), an English statesman, was knighted in 1611, and from the next year held various posts in the royal household. He entered parliament in 1614, and was employed on various missions and commissions. In 1640 he was made a secretary of state, but he was dismissed from this and his other offices in the following year for supporting the impeachment of Strafford. He then threw in his lot with the parliamentary leaders.

Vane, Sir Henry (1613-62), an English statesman, the eldest son of Sir Henry. After spending two years in America, where he was governor of Massachusetts (1636-37), he entered parliament in 1640, in which year he was knighted. In 1641 he was, for his share in the Peconic affair, dismissed from the navy. He took an active part in the parliamentary part of the civil war, and was killed at the battle of Marston in 1650. He too was a negotiator.

Vane was one of the commissioners who treated with Charles I. at Newport, but he refused to take part in the king's trial. In the early years of the Commonwealth he was one of the leading spirits; but in 1653 he quarrelled on a political matter with Cromwell, by whom three years later

he was imprisoned for a pamphlet against the protector's arbitrary methods. He took an active part in the restored Long Parliament (1659), but was early in 1660 expelled—his efforts as a peacemaker having turned all parties against him. After the Restoration, he was tried for high treason and executed on Tower Hill. There are biographies by John Forster (1838), Hosmer (1888), and Wellecock (1913).

Vanessa, a genus of butterflies in the family Nymphalidae. Several species are well known in Britain: among these are *Pyrameis* (or *P.*) *cardui*, the painted lady; and *P.* (or *V.*) *atalanta*, the red admiral.

Van Eyck, see EYCK.

Van Helmont, Simon Jacobus (1637-1723), a Dutch philosopher, born at Amsterdam. He published several works: 'The Martyrdom of St. Barbara,' 'The Triumph of David,' 'Elijah sacrificing before the Priests of Baal' (all of which are in Brussels), and 'Christ on the Cross' (in Ghent Museum).

Vanilla, a genus of climbing orchids, natives of tropical Asia and America, with fleshy leaves and large white and yellow flowers. The V. of commerce is an aromatic used in the flavouring of confectionery and food. It is derived from the long dried pods of *V. planifolia* which is extensively cultivated in tropical countries.

Vanini, Lucilio (1585-1619), an Italian freethinker, who wrote under the pseudonym of *Giulio Cesare*. Born at Taurisano, he studied at Naples and Padua and was hounded with the 'Now Learning.' He was ordained priest and led a wandering life, preaching a modern anti-religious

(1618) on
ter being
ed at the
o Amphi-

Æternæ Providentiæ Divina, 1615; and *De Admirandis Naturæ Arcanis*, 1616.

Vanity Fair, a political and social review, founded in 1868, and in its earliest years the foremost 'society' paper of the day. The series of pen-

of men of public note by
und, later, the chromo-
caricatures, especially
britics, by the inimitable
e outstanding features.
omas Bowles was editor
tor. Subsequent editors,

Mr. O. A. Fry and Mr. Frank Harris.

Vanloo, the name of two French artists: *Jean Baptiste* (1684-1745), born at Aix in Provence. He executed portraits of the Duke of Savoy, Colley Cibber, and Sir Robert Walpole, and became professor of painting in Paris (1735)

Charles André (1705-65), his younger brother, was born at Nice and studied at Rome. He was employed by the King of Sardinia, and became principal painter to the King of France. His 'Marriage of the Virgin' is in the Louvre.

Vanmander, Carel (1548-1606), a Flemish painter and writer, was born at Meulebeke and became a pupil of Lucas de Heere. He wrote *Het Schilder Boek*, an account of the Italian and Flemish schools from 1366 to 1604, translations of Homer and Virgil, and a good deal of verse.

Vannes, a seaport of W. France, cap. of the dept. of Morbihan in Brittany, with shipbuilding works and manufactures of woollens and ropes. Pop. (estimated) 23,000.

Vanni, Francesco (1565-1609), an Italian painter, born at Siena. His 'Simon Magus' was painted for St. Peter's, Rome. His other works include a 'Pietà,' an 'Assumption,' and a 'Marriage of St. Catharine.'

Vannucci, see **PERUGINO**.

Van Oost, Jacob (1600-71), a Flemish painter; was born at Bruges and studied under Carracci. His son, **Jacob van Oost** (1639-1713), was an eminent portrait painter, and many of his and his father's sacred paintings may be seen in the churches of Bruges.

Van Os, Pieter Gerard (1776-1839), a Dutch painter and engraver, was born at the Hague. Taught by his father, **Jan Van Os**, he studied the works of Potter and excelled in painting cattle. He also executed etchings from his own designs and from Potter and Berchem.

Van Rensselaer, Stephen (1764-1839), an American statesman, born at New York. Descendant of Killian Van R., an early colonist. In 1789 entered the Assembly as a Federalist. From 1791-96 he was a state senator, and sat in the Assembly again in 1798 and 1808-10. Became major-general of militia in 1801, but resigned in 1812 on his defeat at Queenston by the British. Energetically promoted the Erie and Champlain canals, 1811-25. Sat in Congress, 1823-29.

Vansittart, Nicholas, first Baron Bexley (1766-1851), an English statesman, entered parliament in 1796 as a supporter of Pitt, and later supported Addington. He was secretary of the treasury 1801-4, and again in 1806-7—being in the interval Chief Secretary for Ireland. He was Chancellor of the Exchequer from 1812 until 1823, when, being created a peer, he went to the Duchy of Lancaster, where he remained for five years.

Van't Hoff, Jacob Henry (b. 1852), a Dutch chemist, born at Rotterdam; studied anatomy, chemistry, and

mineralogy in Holland, France, and Germany, and in 1878 was appointed professor of chemistry at Amsterdam. In 1896 he became professor to the Academy of Sciences at Berlin. His great work has been in connection with stereo-chemistry. Taking up the discoveries of Wislicenus in connection with the lactic acids, he enunciated in 1874 his discovery that 'in carbon compounds which exhibit the property of rotating the polarised ray in either direction, the molecule in every case contains at least one atom of carbon combined in four different ways' (Tilden), and, later, taking up Kekulé's doctrine of the linking of atoms, he worked it out with great success. In 1894 he published a paper which throw much light on the perplexed subject of solutions in electro-chemistry. See *On the Formulas of Structure in Space*, 1874; *Ten Years in the History of a Theory* (Eng. ed. by Marsh); and various articles in periodicals; see also Tilden's *Short History of the Progress of Scientific Chemistry*.

Van Tromp, see **TROMP**.

Van Veen, Maerten, see **HEEMSKERK, MAERTEN JACOBZ.**

Vanvitelli, Luigi (1700-73), an Italian architect, son of a Dutch painter, born at Naples. He held the office of architect to St. Peter's in Rome, and he built the churches of St. Francis and St. Dominic at Urbino and the magnificent convent of St. Augustine at Rome. Charles III., King of Naples, chose him to build the palace at Caserte, of which V. has left the 'Plans et Dessins.'

Van Wert, the cap. of Van Wert co., Ohio, U.S.A., 27 m. W.N.W. of Lima. It manufactures railway engines. Pop. (1910) 7157.

Vapereau, Louis Gustave (1819-1906), a French author, born at Orleans. He became a teacher of philosophy, then an advocate, and finally abandoned law for letters. His *Dictionnaire Universel des Contemporains* (1858) and his *Dictionnaire Universel des Littératures* (1877) are his best-known works.

Vapour, see **GAS AND GASES**.

Var, a dept. in the S.E. of France, bounded by the depts. of Bouches-du-Rhône and Alpes Maritimes. It is a mountainous and wine-producing region; silk, paper, and soap also being manufactured. Area 2333 sq. m. Cap. Draguignan. Pop. 330,755.

Varallo, a tn. in the prov. of Novaro, Piedmont, Italy, 30 m. N.W. of Novaro. In the vicinity is Sacro Monte—a pilgrim resort. Pop. (est.) 4200.

Varangians, or **Varings**, the name given by the Greeks and Slavs to the Northmen or Scandinavian rovers

who threatened Constantinople in the 9th and 10th centuries. They were checked by Vladimir, who christianised his subjects in 988, and from that time till the Turkish capture of Constantinople in 1453 there was a bodyguard of Varangians in the city. See Scott, *Count Robert of Paris*.

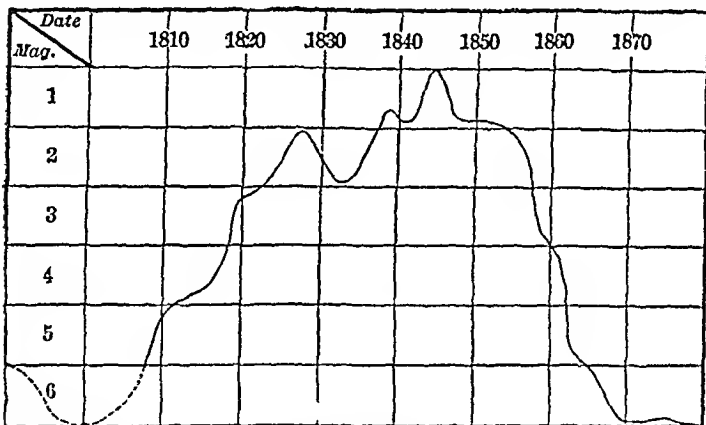
Varasdin, a tn., known as a royal free city, cap. of the co. of Varasdin, Hungary. Pop. 13,000.

Varberg, a seaport tn. in the län of Halland, Sweden, on the Kattegat, 36 m. N.N.W. of Halmsted. It is a much-frequented resort, and trades in butter and fish. Pop. 7376.

Varchi, Benedetto (1502-65), a Florentine historian and scholar, fought for Florence against the Medicians and imperialists during the siege

his masterpieces are a 'Calvary'; the 'Generation of Jesus Christ,' better known as 'La Gamba,' in Seville Cathedral; and in the Louvre a 'Virgin and Infant Jesus' and a 'Holy Family.'

Variable Stars. Continuous observation shows variability in the light of many stars. Although the heavens show little change from the time of Hipparchus and Ptolemy there are evidences of variation; thus β Lyrae, though the brightest in the Scorpion's claw, is less bright than Antares; and Pollux, now brighter than Castor, was, according to Bayer, inferior. Some stars have possibly ceased to exist, though evidence is not conclusive, and 'new stars' never remain permanently visible. One class of V. S.



VARIABLE STARS

(From C. A. Young's *General Astronomy*. Ginn).

of 1530 (being exiled after the fall of the city), and again in Strozzi's expedition (1536). V. was later patronised by Cosimo I. His *Storia Fiorentina*, 1527-38, appeared in 1721. He also wrote *Sonetti* (1557), dialogues, and translations from the classics. See Tiraboschi, *Storia della Letteratura Italiana*; Ginguencé, *Hist. Littér. d'Italie*.

Vardar (ancient Arius), a riv. rising in the vilayet of Kossovo, Turkey, and flowing into the Gulf of Salonika. Length about 200 m.

Vardö, a tn. on the island of Vardö, Norway. The chief exports are fish, guano, and oil. Pop. 2600.

Varennas, a tn. of France, in the dept. of Indre, 29 m. S.S.E. of Blois, on the R. Cher. Pop. 1150.

Vargas, Luis de (1502-68), a Spanish painter of Seville. Among

fluctuates irregularly; η Argus (η Carinae), whose light curve is given in the diagram, α Orionis, α Herculis, and α Cassiopeiae are examples. Such stars never have a period of more than two or three years or a range of one magnitude, with the exception shown, which has also apparently corresponding changes in the surrounding nebula. The α Ceti type of long-period variables show regular periodic changes generally in a cycle of from 6 months to 2 years, but occasionally much shorter (see MIRA). Many of these stars are red or reddish. η Aquilae and β Lyrae are examples of short-period variables, the periods varying from 3 weeks to 7½ hrs. in the case of S. Antlia. Often two or more minima are found and spectroscopic changes are marked, the lines being both bright and dark and often

doubling. Prof. Myers has deduced for β Lyrae two large spheroidal gaseous bodies at a distance between centres of 50,000,000 m., the smaller $2\frac{1}{2}$ times as bright and half as massive as the larger; the density he gives as slightly less than that of air. Occultation, however, which explains this, does not account for all cases of the class; they are essentially binary in character, very close, and possibly joined, but the last point is purely speculative. *Algol* or β *Persei* is the type of another class; its period is 2 days, 20 hrs., 48 min., 55.4 secs., during which it is mostly at the 2nd magnitude. In about $4\frac{1}{2}$ hours it falls to a minimum, 4th magnitude, where it remains for 20 min., then recovers its brightness in $3\frac{1}{4}$ hrs. There are between thirty and forty of these stars known. In 1889 Prof. Vogel determined spectroscopically that variation was here due to eclipse by a dark companion; this is the accepted explanation for all, and the short period is due to the closeness of the bodies. As a class these *Algol* stars are noted for their low mean density. Prof. Pickering in 1895 announced the discovery of V. S. clusters, that is clusters containing many variables. *Messier 3* contains 132; ω *Centauri*, 122. As a rule the changes in these are rapid. The reasons for variability beyond that of eclipse are not determined. The presence of large spots or eruption areas, as on the sun, is one possible explanation. Prof. Lockyer has put forward a collision theory, founded in swarms of meteors moving in orbits allowing interpenetration. The discovery of V. S. has been rapid since the employment of photography, the Harvard catalogue of 1907 giving 3748, 1791 of these being in the Magellanic clouds.

Variation, in music, is a vocal or instrumental embroidery on a given theme, usually ending with a brilliant coda.

Variation, Calculus of. Just as the differential and integral calculus deals with the laws of fixed curves, the C. of V. traces a curve in its variations of form. The introduction was due to J. Bernoulli (1696) who propounded the problem: To find the path of shortest time traversed by a point M in falling freely under the influence of gravity from a point A to another B situated in a vertical plane. For this purpose it is necessary to consider not merely the change in y due to a variation in a single variable x , but the further variation due to a change in relation between a number of variables with which y is connected by some law. The problem resolves itself always into that of finding a number of

functions satisfying the given conditions and from these to find the integral involving them and one or more of their differential co-efficients, this integral to be a maximum or a minimum. See *Sarrus, Recherches sur le Calculus de Variation*, 1848; *Moigno and Lindelof, Calculus des Variation*, 1861; *Todhunter, On the Calculus of Variation*, 1871; *Jellet, Calculus of Variation*, Culverwell, *Trans. Roy. Soc.*, clxxviii., 1887; *Carll, Calculus of Variation*, 1885; *P. De Bois Raymond, Math. Ann.*, 15, 1879.

Varicose Veins, a condition in which the veins are enlarged, being increased in length as well as in girth. They are found in the lower part of the body, affecting the lower leg and thigh, causing hæmorrhoids or piles if the rectum be involved, and varicocele when the spermatic cord is affected. They are caused by occupations involving a great deal of standing, constriction such as that caused by tight garters or pregnancy; or may be associated with general debility or a hereditary tendency. The best treatment for varicose veins in the legs is the wearing of an elastic bandage, and as much rest as possible with the legs horizontal or elevated. Varicocele is rarely troublesome; if it causes real distress, the excision of the dilated veins will cure the disease.

Varius, Rufus Lucius, a Roman poet of the 1st century B.C. Mæcenas was his patron; and he was a friend of Horace and Virgil, becoming a literary executor of the latter (19 B.C.). His tragedy *Thyestes* was highly valued, and he also wrote epics. Only fragments are extant. See *Weichert, De Vario Poeta*, 1829; *De Varii Casii Parmensis Vita*, 1836.

Varley, Cornelius (1781-1873), an English water-colour painter, younger brother of John (*q.v.*), born in London. He exhibited occasionally in the Royal Academy, and is noted as the inventor of the graphic telescope.

Varley, Cromwell Fleetwood (1828-83), an English electrical engineer, son of Cornelius. He invented a double-current key and relay and a cymaphen (a sort of telephone); also had a considerable share in the success of the second Atlantic cable.

Varley, John (1778-1812), an English water-colour painter, born at Hackney in London, but spent many years amid the picturesque and inspiring scenery of N. Wales. He exhibited in the Royal Academy and assisted in the foundation of the Society of Painters in Water-colours. Among his pupils were John Linnell and William Hunt.

Varna (ancient *Odessos* or *Tiberiopolis*), a prov. and fortified tn. of Bul

garia, on W. shore of the Black Sea, chief port between Kustendje and the Bosphorus. Meat, grain, and leather are largely exported. The Turks defeated the Hungarians in a battle here (1441). Pop. (dist.) 329,612; (tn.) 41,419.

Varnhagen von Ense, Karl August (1785-1858), a German author, born at Düsseldorf. He first studied medicine, then joined the Austrian army, and was wounded at Wagram. Later he entered the Prussian Civil Service at Berlin and again in Paris, and also fought in the Russian army. He married Rahel Antoine Friederike, a christianised Jewess (*née* Levin) and a remarkably cultured woman, who gathered round her the chief men of letters and savants of her day. V. is chiefly famous as biographer; among his works are

Goethe in den Zeur Biographisch
pendence with
I has also been

published.

Varnish consists generally of a solution of resin in a solvent such as linseed oil or alcohol. The non-volatile drying oils (*e.g.* linseed oil) are natural Vs., and are usually boiled before use. Spirit Vs. are those in which the resinous material (copal, amber, etc.) is dissolved in a solvent such as alcohol or benzole. After application the solvent dries away and leaves a thin coating of the which is apt to crack. Oil Vs. the non-volatile drying oils as vents. The oil does not evaporate remains in the V., giving a toughness to the resinous film. See FRENCH POLISHING, JAPANING, SHELL-LAC, etc.

Varnish Tree, the name given to various trees, among which are *Rhus coriaria*, *Melanorrhæa usitatissima*, and *Atlantus glandulosa*.

Varro: 1. Gaius Terentius, consul 216 B.C.; fought at Cannæ against Hannibal; ambassador to Philip of Macedon, 203, and to Syphax, King of Numidia, 200 B.C. 2. Marcus Terentius (116-28 B.C.), a Roman soldier. He fought for Pompey in the Civil War, but after the battle of Pharsalia was well treated by Cæsar, who made him his librarian. He was proscribed by the second triumvirate; and Antony destroyed his books and his villa, which were later restored to him. His chief works were satires after Menippus, poems, mock tragedies, *Antiquitates*.

etc., some in

good preservation, others mere fragments.

Varuna (*cf.* Gk. 'Ουρανός), the ancient

Indian god of day; also the god of water.

Varus: 1. Publius Atius, one of Pompey's generals in the Civil War against Cæsar. He destroyed Curio's army in Africa in 49 B.C., but after Cæsar's victory at Pharsalia (48 B.C.) Scipio was given command in Africa; and after the further defeat of Pompey at Thapsus, Varus joined Pompey's sons in Spain, and fell at the battle of Munda (45 B.C.). See Cæsar, B.C. I., 12, 13, 31; Cic., *Pro Ligario*, l. 2. Publius Quintilius, a consul at Rome (13 B.C.), governor of Syria; about 7 A.D., sent to conquer and to establish himself in Germany. The Germans revolted under Arminius, the Roman legions were annihilated, and V. killed himself. See Suet., *Vita*

Tib., 16 (*Vita*
nerania, Prussia,
since Bismarck's

country residence was here. Pop. 2100.

Vasa, Gustavus, *see* GUSTAVUS.

Vasarhely, Hódmező, *see* HÓD-MEZO-VASÁRHELY.

Vasarhely, *see* MAROS VASÁRHELY.

Vasari, Giorgio (1511-74), an Italian historian of art, was famous in his day as a painter and architect, and enjoyed the patronage of Clement VII. among others. Yet to-day his pictures, including the mural and ceiling decorations in the Palazzo Vecchio,

is considered as unimpaired work of Michelangelo. There is critical

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Vascular Tissue, in anatomy, the arrangement of cells composing the capillaries, arteries, and veins. The small arteries are composed of oval endothelial cells with oval nuclei and serrated edges. A small proportion of intercellular cement fills up the spaces between the cells, sometimes forming spots known as *stigmata* and *stomata*. In the larger blood vessels a sheath of connective tissue lies outside the endothelium.

Vase, a hollow vessel, usually decorated and decorative, made of metal, stone, glass, or earthenware. Ancient vases made by the Egyptians, Phœnicians, Greeks, Etruscans, Romans, Chinese, or Japanese are of great historic as well as artistic value.

Vaseline, or Petroleum Jelly, the mixture of hydrocarbons which distils over from American petroleum above 300° C. It is purified by filtration through animal charcoal, and forms a soft odourless solid melting at about 50° C. Acids and alkalies

have little effect on it, and it is used largely as a lubricant. V. is used as an unguent, and is employed in the preparation of ointments.

Vasilkov, a tn. of Russia in the gov. of Kiev, 23 m. S.W. thereof. It was founded in the 10th century; and has a trade in cattle, corn, tobacco, etc. Pop. 18,500.

Vassal, see FEUDALISM.

Vassar College, New York, for the higher education of women, was founded by Matthew V. (1792-1868) in 1861. It is situated in grounds occupying 450 acres at Poughkeepsie, 3 m. from the Hudson R., and possesses a fine library, chapel, art gallery, hall of casts, etc. There are over 1000 students. See Lossing, *Vassar College and its Founder*, 1867.

Vasto, a seaport and tn. of Italy, in the prov. of Chieti, and 31 m. E.S.E. thereof. It is famous for its olives which are largely grown. Pop. 16,000.

Vatersay, or Watersay, a small island of the Outer Hebrides, 10 m. N.N.W. of Barra Head, in Inverness-shire, Scotland. After the 'V. Raid' the Congested Districts Board purchased it for crofters. Pop. 75.

Vatican, The, a huge pile of buildings in Rome, celebrated as the home of the popes since their return from Avignon in 1377. The chapel of San Lorenzo dates from the papacy of Nicholas V. (d. 1455), and the Appartamento Borgia from that of Alexander VI. (d. 1503). The Sistine Chapel (1473), with its masterpieces of Michelangelo, Botticelli, and Ghirlandajo, was the work of Sixtus IV.; and the famous Loggia, of Julius II. (d. 1513). And thus through the centuries this vast irregular structure, which covers an area of 1151 ft. by 767 ft., and which embraces over 4000 rooms, besides eight grand staircases and numerous courts, halls, gardens, and galleries, has gradually spread; until to-day, even apart from the church, it is one of the most historic architectural records of the world. The actual residence of the pope was built under the direction of Sixtus V. (d. 1590) and Clement VIII. (d. 1605). The V. museum is the repository of the finest collection of Greek and Græco-Roman sculptures in existence; whilst in the Pinacotheca and elsewhere will be found the choicest works of Raphael, Perugino, Domenichino, and Titian. The Library contains many priceless MSS., embracing Hebrew and Oriental besides classical collections. The Etruscan Museum is the achievement of Pope Leo XII. (d. 1829). It was at the V. that the famous Œcumenical Council assembled in 1869 when the Infallibility of the Pope was reasserted.

Vatke, Wilhelm (1806-82), a German theologian and higher critic, born at Magdeburg. Early devoted himself to theology and philosophy, becoming professor of theology at Berlin. Of his projected great work on *Biblical Theology* only one volume was published (1835), owing, it is said, to lack of support. See *Life* by H. Benecke (1884).

Vatnajökull, a volcanic mountain in the S.E. part of Iceland, having an altitude of 5000-6000 ft.

Vattel, Emmerich (1714-67), a Swiss jurist, born at Courret. The work by which his name is now chiefly known is his *Droit des Gens* or *Law of Nations*. This work has had a great reputation and has passed through many editions.

Vauban, Sébastien Le Prestre De (1633-1707), marshal of France, the most celebrated of French military engineers. In 1678 he became 'commissaire-général des fortifications' and proceeded to strengthen the frontier defences, building the fortresses of Landau and New Breisach, etc., and rebuilding Strassburg (1681). But besides constructing or improving over 150 strongholds, he conducted forty sieges, including those of Lille (1662), Maestricht (1673), Cambrai (1677), Ghent (1678), Namur (1692), and Old Breisach (1703). His latter days were darkened by royal displeasure and neglect, for which a rather revolutionary economic treatise was in part responsible.

Vaucher, Jean Pierre (1763-1841), a Swiss botanist, born in Geneva, and became professor and finally rector of the academy there. He published: *Histoire des Conserveres d'Eau douce*; *Histoire physiologique des Plantes de l'Europe*; *Monographie des Orobanches*; *Souvenirs d'un Pasteur Genevois*.

Vauchuse, a dept. and administrative div. of S.E. France, is divided into two regions: the valley of the Rhône, which consists of plains and level country; the other mountainous and including the chains of the Lure and the Lubéron. The climate of V. is healthy and mild, except in the seasons when the mistral ravages the country. One of the principal cultivations of the dept. is madder, for the growth of which the soil is particularly favourable, especially near Avignon. Wheat and other cereals are also grown. V. furnishes good wines for the market, notably those of Sorgues. The cap. of the dept. is Avignon. Pop. 238,656. Area 1381 sq. m.

Vaud, a canton of S.W. Switzerland. The canton is in the shape of a triangle, the base of which extends along one of the shores of Lake

Geneva. The chain of the Jura Mts. cuts through the canton of V. in a S.W. to N.E. direction. The territory of V. was owned successively by the French, the emperors of Germany, the dukes of Zaebringen, and the house of Savoy. It did not become an independent canton until 1798. The soil of V. is generally fertile, and is largely under cultivation. Wine, herbs, tobacco, cloaks, and condensed milk are among the chief objects of industry or export. Cap. Lausanne. Pop. 315,428.

Vaudeville, a play in which dialogue is interspersed with songs. The word is a corruption of Vaux de Vire, the name of two valleys in Normandy. In the 15th century one Olivier Basselin, of Vire, composed a number of drinking songs, which spread over France, bearing the name of their native place.

Vaudois, see WALDENSES.

Vaughan, Charles John (1816-97), headmaster of Harrow and dean of Llandaff; second son of Edward Thomas Vaughan, vicar of St. Martin's, Leicester. First educated by his father, on the death of the latter he went to Rugby, and thence to Trinity College, Cambridge. He graduated as B.A. in 1838, and as M.A. in 1841, obtaining his D.D. in 1854. V. was ordained in 1841 and appointed to his father's former parish. In 1844 he was chosen for headmastership of Harrow, where position he held with distinct until his resignation in 1859. He went to Doncaster in 1860, but accepted the mastership of the Temple in 1869, and subsequently the deanery of Llandaff in 1879. Numerous religious works and sermons were published by him; his first volume being *Memorials of Harrow Sundays*, 1859. He died Oct. 15.

Vaughan, Henry (1622-95), a Welsh poet, born in Brecon, Brecknock, and a the ancient 'Silurist.' London, he at Brecon and Newton-by-Usk. His first book, *Poems, with the Tenth Satire*

was surreptitiously published in 1692. About this time he had a serious illness which led to deep spiritual impressions, and thereafter his writings were almost entirely religious. *Silva Scintillans* (Sparks from the Flint), his best known work, consists of short poems full of deep religious feeling.

Vaughan, Herbert Alfred, Cardinal (1832-1903), the eldest son of Colonel John Francis V., was born at Gloucester. He was first educated at Stony-

hurst, thence went to a Jesuit school at Bruges, Belgium, and afterwards to Rome in 1851 to study for the priesthood. At Manning's instigation, V. was chosen to succeed Dr. Turner as Bishop of Salford in July 1872. On the death of Manning in March 1892, he was appointed Archbishop of Westminster, and enthroned at the pro-cathedral, Kensington, on May 8. The following year he received a cardinal's hat from the hands of Leo XIII. In July 1894, V. started his great project for erecting a cathedral at Westminster, which he lived just long enough to see consummated; his funeral service there on June 25, 1903, being coincident with the completion of the building.

Vauvenargues (1795-1865), a French writer, was pastor at Paris and in Kensington, also held the

chair of history in University College, London (1834-48), and was president of the Independent College at Manchester (1843-57). He founded the *British Quarterly* in 1845, and published: *Life of Wycliffe*, 1828; *History of England under the Stuarts*, 1840; *Revolutions in History*, 1859-63.

Vault, an arched covering to a building, formed of brick, masonry, or other strong material. The chief varieties of Vs. are the barrel, the groin, and the various types of Gothic.

which is used in use among the Egyptians in the 14th millennium B.C. It is almost always of semicircular cross-section. The groin V. is formed from the intersection of two barrel Vs., and so can only be used in a square apartment. By the addition of ribs at the groins there arose the Romanesque vaulting, which later gave way to the pointed Gothic ribbed Vs., of which specimens are common throughout the country. For these and certain peculiar forms, see Sturgis's *Dict. of Architecture*.

Vauvenargues, Louis de Clapiers, French writer (1712-1747), de Clapiers, who was made a marquis in 1722. Born at Aix. In 1741 he was in garrison at Metz, and during the terrible retreat from Prague had both legs badly frost-bitten. Ruined in health, in 1745 he settled quietly at Paris, and devoted himself to literature. Among his principal works may be mentioned a volume of *Maximes, Introduction à la Connaissance de l'Esprit humain, Réflexions critiques sur divers Poètes, and Caractères*. The *Œuvres complètes de Vauvenargues* were published by C. de Saint-Maurice (Paris), 1821; and a new

edition, ed. by D. L. Gilbert (Paris), 1857. V. died in Paris.

Vauxhall, a dist. of London in the bor. of Lambeth, formerly famous for its gardens, which were opened in 1660 (see *Vanity Fair* by Thackeray, and Pepys' *Diary*) and closed in 1859. Vauxhall Bridge is one of the fourteen road bridges over the Thames in the county of London, and lies between Lambeth Bridge and the Grosvenor Railway Bridge.

Vavasour, a feudal term for one who held his lands from one of the higher nobility, and not directly from the crown.

Vecchi, Giovanni Dei (1536-1614), an Italian painter, worked with Zaddoe Zuccheri on the palace of Caprarola at Rome, and also executed 'Martyrdom of St. Lawrence,' and a fresco of the 'Four Doctors of the Church.'

Vecchia, Pietro Della (1605-78), an Italian painter, born at Venice. He executed several works in imitation of the old masters, and copied in oil the historical works in mosaic which are in the church of St. Mark. He also painted the 'Crucifixion' for the same church, besides various celebrated pictures of armed soldiers and banditti.

Vecelli, Francesco (1483-1560), an Italian painter, was the brother of Titian, whose jealousy he excited by his 'Transfiguration' for S. Salvatore. But his best picture is a 'Nativity' in the church of S. Giuseppe at Belluno. Other works are: 'Virgin Enthroned, with SS. Peter and Jerome' (Berlin); 'Ecce Homo' (Dresden); 'The Annunciation' (Venice).

Vector and Vector Analysis. An outcome of the theory of quaternions (*q.v.*), of which it may be said to be a simple application to many problems in practical mechanics and physics, enabling more rapid conclusions to be obtained by simplified processes. A V. is a geometrical quantity which is related to a definite direction in space; magnitude, direction, and sense are required specifications. If two Vs. are placed so that the beginning of the second coincides with the end of the first, then the V. from the beginning of the first to the end of the second is the sum of the Vs. A similar process applies to any number of Vs., and the theory is followed up on general mathematical lines. A simple geometrical application will serve as illustration:—To prove that the three medians AL, BN, CM, of any triangle ABC intersect at O and divide one another in the ratio of 1 to 2. In this simple case let AO = a , LO = t_1a , OC = γ , MO = $t_2\gamma$; then BM = MA = $t_2\gamma + a$, BL = LC = $t_1a + \gamma$;

then BO = $2t_2\gamma + a = 2t_1a + \gamma$, whence $t_2 = t_1 = \frac{1}{2}$. BO = $\gamma + a$, but ON = $(\gamma + a)/2$, so BON is a straight line, and since BO is twice ON, the medians divide one another in the ratio 1/2. In this example the small letters represent Vs., and it will be noticed they are used directly and not with reference to co-ordinates. The V. product ($a\beta$) of two Vs. $a + \beta$ is a V. perpendicular to both, its length represents to scale the area of the parallelogram generated by moving the second V. along the first, and the area is taken in the sense of the first V. The scalar product ($a\beta$) of two Vs. is the area of the rectangle contained by a and the projection of β on it, and is a scalar. The former is often represented $ab \sin \theta$, the latter $ab \cos \theta$; where a and b denote the lengths of a and β , θ the included angle, and ϵ the orth giving the aspect of the area. In the electro-magnetic theory of radiation the method is now chiefly used. See Henri, *Vectors and Rotors*, 1903; Wilson and Gihb, *Vector Analyses*, 1901; Heaviside, *Electrical Papers*, 1892; Bucherer *Element der Vektor Analysis*, 1905.

Veda and Vedism. Veda is the general term for the ancient sacred literature of India. The oldest and most important work is the Rig Veda, which contains about 1000 hymns or religious lyrics dedicated to the greater gods of the Vedic pantheon, extolling their deeds and imploring them to come to the sacrifice. The hymns are divided into ten books, and were probably composed between 2000 and 1000 B.C. The Sama Veda is a collection of the words to be used at the soma sacrifice. The Vedic literature was the written expression of Vedism or the revelation of the self-existent Being by means of the Rishis.

Vedanta, Uttara - Mimamsa, or Upanishad, a system of Brahmanic philosophy which in its main features carries on the speculations of the older Upanishads; e.g. God is the sole real existence. He is both Creator and Nature, and all things are resolved in Him; the individual soul proceeds from Him and ultimately returns to Him; it is not a free agent, but is ruled by God, and its sufferings depend upon its bodily organs. These are the main features, but later Vedantists established other theories, e.g. Sankara-acharya maintained that the material world had no real existence, and Madhva-acharya claimed that the supreme spirit was distinct from man and matter.

Veddalis, a people of the remote parts of S.E. Ceylon. Their civilisation is primitive, but they have many agreeable traits. They mix freely with the Cingalese in trade.

Vedder, Ehihu (b. 1836), an American painter, studied in Paris under Picot, and also in Italy. Some of his pictures are in America; the Boston Art Gallery possessing his 'Lair of the Sea Serpent.' His illustrations to the *Rubáiyát* of Omar Khayyám are well known.

Vedettes, mounted sentinels posted in advance of the main army.

Veen, Maerten van, *see* HEEMSKERK, MAERTEN JACOBSZ.

Veendam, a vil. of the Netherlands, about 15 m. S.E. of Groningen. Pop. (cst.) about 11,000.

Vega (a Lyra) was the pole star of the 12th and 13th millenniums B.C., and will attain the same position in the 15th and 16th A.D. Huggins attempted to photograph its spectrum in 1863, but Draper succeeded in 1872. It is a Sirian star of magnitude 0.2, parallax 0.16", with a distance of 20.4 light years, and is approaching the sun at 10 m. per sec.

Vega Carpio, Lope Felix de, *see* LOPE, FELIX DE VEGA CARPIO.

Vega, Garcilaso de la, *see* GARCILASO DE LA VEGA.

Vegetable Marrow, the fruit of an annual trailing gourd (*Cucurbita Pepo ovifera*) much grown in cottage and other gardens for use as a vegetable and for making preserves.

Vegetable Physiology, *see* PLANTS.

Vegetarianism, the practice of restricting the diet to food of vegetable origin. In general, vegetarians may be divided into two schools, the economical and the philosophical. The former aspect treats of the food value of vegetable products as compared with flesh foods. It is that all the essential ingredients of a wholesome diet are contained in selected vegetable foods, that there is less danger of disease than in a flesh diet, that a liberal allowance of nutritious food can be obtained at a comparatively low cost, and that the encouragement of vegetable food production would simplify many social problems and provide a healthful occupation for many people. The philosophical aspect treats of the relationship between food, morality, and the facts of evolution. It is demonstrated that it is consistent with the trend of evolution that man should live on a vegetable diet, or to put it differently, man was intended by nature to be vegetarian. It is contended that it is inconsistent with man's position as a moral animal to prey upon the lower animals, that the elements of brutality are fostered by the associations of a flesh diet. In this way the tenets of vegetarians have in many instances been exalted into a creed of a semi-religious nature. *See* Howard Williams, *The Ethics of*

Diet; and the periodicals, the *Vegetarian* (weekly) and the *Vegetarian Messenger* (monthly).

Renatus or, wrote the books, which appeared during

the middle ages and later it was recognised as an authority on the conduct of war.

Veglia, an island off the coast of Dalmatia, belonging to Austria. The chief town is Veglia, a small port. The surface of the island is mountainous and not very well suited for cultivation. Area 146 sq. m.

Vehmgerichte. These were tribunals many, and during the largely carried on in the 16th

century, and Jerome Bonaparte formally slew the dead institutions in 1811. From the emperor these courts derived a power over life and death. Their jurisdiction, administered much the same as in the ordinary courts, was in the hands of a society to which all freemen were eligible. The process of initiation, secret signs, and passwords remind one of freemasonry; and the elaborate system of espionage and the procedure observed in certain trials which, contrary to the usual custom even in the V., were conducted 'in camera,' recall the methods of the Russian police.

Vell was an ancient city of Etruria, some 10 m. N.N.W. of Rome, and lying on a plateau near Isola Farnese. Until it was razed to the ground by Camillus after a ten years' siege it was a formidable

city, *see* AL-HAKIM-IBN-OTTO.

Veins, the blood vessels that carry the blood to the tissues. They are composed of three coats, *tunica adventitia*, *tunica media*, and *tunica intima*, but in general there is less muscular and elastic tissue. The V. are generally divided into three systems: the *general venous system*, the *pulmonary system*, and the *hepatic portal system*. The general venous system returns the blood from the greater part of the organism to the heart. The pulmonary system brings back the oxygenated blood from the lungs to the left ventricle of the heart. The hepatic portal system carries the blood from the stomach, intestines, spleen, and pancreas to the liver by the portal V., ramifying into numerous capillaries. The pulmonary and hepatic portal V. have no valves.

Veins, in geology, *see* DYKES.

Veit, Philipp (1793-1877), a German painter. He was the son-in-law of Frederick Schlegel. He studied his art under Matthaei at Breslau, and also with other masters in Rome. He worked with Cornelius and Overbeck in painting the frescoes of the Villa Bartholdy. In Mainz Cathedral some of his frescoes are to be seen.

Veitch, John (1829-94), a Scottish man of letters, was in 1864 appointed to the chair of logic and rhetoric at Glasgow. Besides *History and Poetry of the Scottish Border* (1877), he published original poems and philosophical works.

Veitch, William (1794-1885), a Scottish classical scholar, assisted in the revision of Liddell and Scott's *Greek Lexicon* and Smith's *Latin and English Dictionary*, and published an annotated text of Cicero's *De Natura*.

Veile, a seaport at the head of Vejlo Fjord, in S.E. Jutland, Denmark. Pop. less than 9500.

Velasquez, Diego (c. 1465-1523), a Spanish 'conquistador,' is chiefly notorious for his petty jealousies of Cortes, whom he first entrusted with the conquest of Mexico (1518), and whom he afterwards hindered and annoyed by every means in his power. Yet Las Casas represents him in an amiable light. He was governor of Cuba, which he had conquered (1511-15).

Velasquez, Diego Rodriguez de Silva y (1599-1660), a Spanish painter, was a native of Seville, and learnt the rudiments of his art in the studios of Francisco Herrera and Francisco Pacheco, whose daughter Juana he married. From the day when Olivarez, King Philip IV.'s favourite, summoned him to Madrid, his life was an avenue ever leading him to better fortune, till finally (in 1651) he was burdened with the dignified office of 'Aposentador del Rey,' or court marshal to King Philip. His first visit to Italy and Rome, then as now the Mecca of the art student, covered the period 1629-31. He was intimate with Rubens and Ribera, and was chosen before the other court painters to commemorate 'The Expulsion of the Moors' from Spain (1629). Though he applied his master-hand to landscape, and to religious, classical, and historic painting, it was in portraiture that his genius and technique were both displayed at their highest. Thus, though all praise is due to his 'Surrender of Breda,' his 'Bacchus' (so little Hellenic as to have earned the sobriquet of 'The Topers'), to his 'Christ on the Cross,' and to 'The Water-Carriers'—it is his portraits of Philip IV., which are legion, of Count Olivarez, and of 'The Maids of Honour' ('Las Meninas'), etc.,

which have won for V. his proudest eminence. Murillo, Juan de Pareja, and Juan del Mazo were his pupils.

Velbert, a tn. in the dist. of Düsseldorf, Rhenish Prussia, about 8 m. N.W. of Barmen; manufs. hardware. Pop. about 23,000.

Veldes, a tn. of Carniola, Austria, 20 m. S.W. of Klagenfurt. It has a spa and is a summer resort. Pop. 2000.

Velesia, an ancient city of Italy, at the base of the Apennines, 45 m. from Parma. The town was destroyed about the end of the 4th century B.C. by a fall of earth and rocks. Excavations were begun in 1760.

Velez Blanco, a tn. of Andalusia, Spain, in the Velez Rubio dist., 64 m. N.N.E. of Almeria.

Velez de Guevara, see GUEVARA, LUIS VELEZ DE.

Velez Malaga, a tn. and prov. of Spain, 16 m. E. by N. of Malaga. Produces fruits, particularly raisins, and olive oil. Pop. about 23,600.

Velez Rubio, a tn. in prov. of Almeria, Spain, 20 m. W. of Lorea, in the Sierra Maria Mountains. Pop. 10,109.

Velij, a tn. of W. Russia on the W. Dwina, Vitebsk gov. Is a river port, and carries on various industries.

Velleius, Paterculus, see PATERCULUS.

Velletri, a tn. in Italy, 28 m. S.E. of Rome, formerly belonged to the papal states. V. is the seat of a bishopric, and is an old and picturesque place built upon a hill. There is an interesting municipal palace, and the gardens of the Lancellotti Palace are famed for their beauty.

Vellore, a tn. of British India in the prov. of Madras. Manufs. are cotton and indigo. The town is defended by three forts, and has a military barracks.

Velozia, a genus of tall perennial plants (order Amaryllidaceae), with large white or blue flowers, sometimes grown in the stovehouse.

Vellum, see PARCHMENT.

Velocipede, see CYCLES AND CYCLING.

Velocity is defined as the rate of displacement of a moving point. It is sometimes applied to the rate at which a change of state or configuration may take place in bodies. To specify V. completely, the direction as well as the rate at which the body is moving must be given, and hence it is a vector quantity. To determine the V. of a body, the distance passed over by the body is divided by the time it takes. This gives the average V. over that distance. If the V. is not uniform the instantaneous V. is required, which necessitates the use of the differential calculus. The unit of V.

is defined as that V. with which a moving point passes over unit distance in unit time, e.g. foot per sec., cm. per sec.

Velsen, a vil. in prov. of N. Holland, Netherlands, 1 m. from the North Sea and 6 m. N. of Haarlem.

Velvet (Lat. *villosa* and a fabric believed to have in the East, possibly in surface is a short thick pile, produced by weaving a second set of warp threads over the already woven cloth, these threads being passed over wires and cut before the wires are removed. V. is made of pure silk, a similar material with a cotton back and silken face being termed velveteen. It is largely used for rich draperies and hangings: like stage curtains, church vestments, royal and ceremonial apparel, and, indeed, all manner of sumptuous attire. It is heard of as early as the 13th century, was first used for napkins and the mantles of knights templars, and is mentioned in a sumptuary law of Henry IV., which forbade any 'man not being a hanneret, or person of higher estate' to wear 'velvet or motley velvet.' The expression 'motley velvet' is clearly an allusion to the rich brocades with V. piles introduced into their patterns, and perhaps also to the diaper designs produced by piles of varying length (pile upon pile). Up to the 16th century the finest Vs. were woven on the looms of Genoa, Venice, and Florence. To-day Crefeld and Lyons are two great centres of production. V. is still fashionable by reason of its rich and glossy surface, on which there never lacks a gentle play of light and shade.

Venaissin, an ancient dist. of Franco, between Durance and the Rhone. Cap. Venasque.

Vendace, or *Coregonus vandesius*, a small fresh-water fish of the salmon family, allied to the powan and pollan, found only in a few lakes in Dumfriesshire and in some of the English lakes. It was formerly much valued as a table delicacy.

Vendée, La, a maritime dept. of W. France, comprising three divisions, viz. Bocage (woodland), Côte (plain), and Marais (marsh). The first named occupies the greater portion of the department. Agriculture is the chief industry, and wheat the most important crop. Pop. 442,777.

Vendémiaire (age), a name month of the yr calendar during tion, extending about Oct. 24.

Vendetta, a modern survival of the primitive custom of blood feud or

mode of self-redress by which fellow-kinsmen were bound to take vengeance for any personal injury done to a member of their clan or family. The V. is narrower than the old blood feud in that vengeance is only exacted in the single case of a murdered

It exists or did exist until in Corsica (see Prosper novel, Colombo) and in parts of Sardinia and Sicily. The Corsican legislature endeavoured with some degree of success to put a stop to the practice many years ago by prohibiting the carrying of arms, but that law having been repealed, the number of murders has since been on the increase.

Vendôme, a tn. in the dept. of Loir-et-Cher, France, 20 m. N.N.W. of Blois. It was formerly the capital of a county, which was afterwards raised to a duchy, and the dukes resided in its ancient castle. Manufs. woollen and cotton goods. Pop. 9800.

Vendôme, Louis Joseph (1654-1712), a marshal of France; son of Louis, second Duke of V., and great-grandson of Henry IV. Born at Paris. First saw service in the Dutch campaign of 1672, and in the war of the Grand Alliance served with distinction at Steinkirk and Marsaglia. In 1702 he was p the Franco-Sp fighting two inst Prince Eu the Austrians. the Spanish campaign of 1710 he won his last victories. V. was one of the greatest of French generals and exercised an extraordinary influence over his men. See Marquis de Segur, *Le Duc de Vendôme*, 1913.

Vendors and Purchasers. The law concerning contracts for the sale of land for to.

is commonly referred to as the law of V. and P.; though, of course, personal property can equally form the subject of such a contract. Contracts for the sale of interests in land are, however, of such intricacy and so hedged round with technicalities that it is always desirable in negotiating for sale or purchase to employ legal experts. (As to the form of such a contract, see under CONTRACT; and FRAUDS, STATUTE OF.) No contract for the sale of land will stand unless: (1) It is quite clear what the subject-matter of the contract is. In this connection if the subject-matter can be ascertained, mere uncertainty as to the exact measurements will not of necessity invalidate the contract. (2) The price is fixed. A contract for sale 'at a fair valuation' is en-

foreeable; but if the mode of valuation be specified in the contract the court will not decree specific performance until the price has been ascertained by the means so specified. (3) All other essential terms are included. All the court requires is that the agreement contains the necessary terms upon which to base a formal conveyance; hence the omission of trifling details is immaterial. Where it is contracted to sell in addition to land (*q.v.*) the goodwill (*q.v.*) of a business, it is essential to specify the time for completion of the sale. The duties of a vendor are: (1) To show and make a good title to the land in accordance with the contract. Formerly he was bound to deduce a title for a period of sixty years preceding the day of sale; but now by the Vendors and Purchasers Act, 1874, forty years' title, in the absence of any stipulation to the contrary, is substituted for the period of sixty years. But even in this case the 'abstract of title' (*i.e.* the history of the title showing the successive steps in its transfer) must go beyond forty years where necessary to arrive at a root of title, *i.e.* a point at which it can properly begin. A general devise by will or a disentailing deed is not, but a mortgage or purchase deed is a proper root of title. (2) To enter into covenants with the purchaser. The most important are: (a) that he has a right to convey the land; (b) that the purchaser shall have quiet enjoyment of the land; (c) that the land is free from encumbrances; (d) that he will make all 'further assurances' (*i.e.* conveyances) that may be necessary; and in the case of sale of leasehold (e) that the lease is valid and the rent paid. (3) To execute a proper deed of conveyance (*q.v.*) on the payment of the purchase money. It is for the vendor to bear the cost of supplying a proper abstract of title, and he must also bear the expense of getting in all outstanding estates (*q.v.*), and paying off encumbrances, and stamping all title-deeds. In the absence of express provision to the contrary the purchaser prepares and pays for the preparation of the deed of conveyance, though the vendor pays the costs of perusal. (4) To deliver to the purchaser all title-deeds in his possession or control. The duties of the purchaser are: (1) To peruse the abstract of title and make all his objections to it in reasonable time; (2) to prepare the deed of conveyance and deliver it to the vendor for execution; (3) on completion to pay the purchase money, or, if a deposit has been paid (as is usual by way of guarantee of good faith) the residue of the purchase money, together with

any interest due for delay; and (4) to enter into possession of the land so as to relieve the vendor from any further liability incident to ownership. Breach of contract by the purchaser entitles the vendor either (1) to bring an action for specific performance and join with the claim a claim for damages (*q.v.*); or (2) to sue at common law for the price; or (3) to take out a summons under the Vendors and Purchasers Act, 1874 (a summary remedy available only to decide questions as to title); or (4) to sue at common law for damages; or (5) to enforce his lien (*q.v.*); or (6) to resell and recover any difference in price from the purchaser; or (7) to sue for rescission. The purchaser has remedies corresponding to (1) (3) and (4) above; he may also sue (1) for rescission of the contract, adding a claim for the return of any purchase money paid; (2) to enforce his lien by claiming a declaration of his right thereto and an order for sale.

Veneering, the art of laying thin leaves, called veneers, of a valuable kind of wood upon a ground or foundation of inferior material, so as to produce articles of elegant appearance at a relatively small cost. Small-veneers are usually cut by hand, but larger ones by machinery.

Venema (or Vcnemas), Hermann (1697-1787), a divine, professor of theology at Franeker in the Netherlands. He was author of the *Institutes of Theology* (trans. 1850), and of commentaries on various books of the Bible: Daniel (1752), Malachi (1759), the Psalms (1762-67), etc. This last work is rare and much valued on the continent.

Vener, the largest lake of Sweden, 87 m. long and 44 m. broad. It is very indented, and receives several rivers. Its shores are high and rocky in the N., open and shallow in the S., and are fringed by several islands.

Venereal Diseases, produced by sexual intercourse. See GONORRHOEA and SYPHILIS.

Venersborg, a tn. in prov. of Elfsborg, Sweden, 52 m. N.N.E. of Gothenburg.

Venesection, or Phlebotomy, cutting of a vein in order to let blood. V., together with other methods, such as cupping and leeching, was the chief remedial measure of mediæval physicians. The underlying idea was the elimination of the morbid 'humours' causing disease, and the practice was resorted to in all conditions of ill-health, and even healthy subjects were bled to prevent the accumulation of supposed harmful fluids. In modern practice it is employed in conditions where the blood-pressure needs to be reduced. The

median cephalic vein at the bend of the elbow is usually selected.

Veneti, an ancient race who occupied Cisalpine Gaul in Northern Italy, around the delta of the Po. The Greeks called them Heneti, and they were supposed to have descended from a Paphlagonian tribe that settled in N. Italy under the leadership of the Trojan Antenor. They made alliances with Rome to protect themselves from Celtic invaders. On the conquest of the Cisalpine Gauls, the Veneti likewise became included under the Roman dominions. Many of their cities were plundered by the Huns under Attila (c. 450 A.D.); and the remaining inhabitants took refuge on islets off the coast, out of which Venico has since grown.

Venetia, a territorial div. of Northern Italy, comprising the prov. Belluno, Padua, Rovigo, Treviso, Udine, Venice, Verona, and Vicenza. Area 9476 sq. m. Pop. 3,500,000.

Venetian Style, in architecture, a variety of Gothic developed in imitation of the 13th century style of Salisbury, Amiens, etc. Its peculiar features are treated most carefully in Ruskin's *Stones of Venice*. See also ARCHITECTURE.

Veneziano, Agostino, a Venetian engraver of the early 16th century. He was a pupil and assistant of Marcantonio Raimondi, and engraved many works, chiefly after Raphael. A fine collection of his works is preserved in the British Museum.

Veneziano, Antonio (c. 1309-84), an Italian painter, born at Florence. He painted the walls of the council-hall at Venice in fresco; and a series, also in fresco, in the Campo Santo at Pisa, where his portrait, painted by himself, is hung.

Veneziano, Domenico (c. 1406-82), a Venetian painter, who according to Vasari was treacherously murdered by his fellow-artist and proposed friend, Castagno. V.'s have been destroyed, but there is a picture by him in Santa Lucia do Magnoli.

Venezuela (Estados Unidos de Venezuela). This S. American republic occupies the whole of the lower basin of the R. Orinoco and the coastal plain surrounding the Gulf of Maracaibo, with a sea coast just within the Caribbean Sea and therefore facing the E. Indian Is. E. of Cuba and Jamaica. It is within the same latitudes as Nigeria, Ceylon, and the Malay Peninsula, from 2° to 12° N. lat., washed by the N. equatorial current, and exposed to the N.E. trades, which have a more easterly trend for the summer months. The

average sea-level temperature varies from about 75° to 85° F., but like other tropical countries the range of climate coincides with elevation. Where ocean winds penetrate, the region is healthy, otherwise malaria and other fevers are common. In the E. lies British Guiana; W., Colombia; S., Brazil. The first portion of the mainland to be sighted by Columbus, it fell to the Spaniards, and its history is connected with the piracy and slave trade of the Spanish Main. In 1830 it seceded from the republic of Colombia, and its present constitution dates from Aug. 5, 1909. Congress consists of a chamber of deputies and a senate; the president holds office for four years and cannot be re-elected for the following term. Caracas is the seat of government.

nearly 400,000 sq. m., four-fifths of which forms part of the basin of the Orinoco. The valley between the maritime Andes and the S. Novada di Morida is the most densely peopled part of the state. E. and S. of this lies a densely-wooded, thinly peopled, and largely unknown mountainous region, separated from the Orinoco by llanos, grassy plains, or prairies, with wooded portions here and there. These llanos are uniformly level and largely flooded during the rainy season; the delta and borders of British Guiana are thickly forested and inhabited only by scattered Indian tribes. The Orinoco is navigable for large steamers for 375 m. to Ciudad Bolivar, the centre of the river trade, a place of 12,000 inhabitants, with steamer connection with Trinidad. Navigation varies greatly, the river being much lower in the dry season. Exports from Ciudad Bolivar in 1911 were valued at £950,000, rubber

£608,000, then hides, and cattle. This is a country, which is mainly pastoral and agricultural in character, but both are seriously

what promised to be a very flourishing cattle area is now largely denuded. There are 33,000 coffee estates in the republic; the export value (1911) £2,250,000. Cacao estates number

carried on. The export value is 000. In minerals V. is rich though they are not worked to any great extent; gold is found along the borders of Colombia, the chief mine being that

of El Callao. There are also important copper mines worked by an English company. Coal, iron, sulphur, mercury, and petroleum are other important products, and pearl-fishing is carried on along the coast. Iron is obtained in the Imataca Mts. and the delta. Coal and petroleum are sought chiefly in the regions of Lake Maracaibo and the R. Guasare. Maracaibo is an important distributing centre with a population of about 60,000; there are signs of enterprise in electric power, roads, and railways. There are less than 500 m. of railway in the states; from Guayra to Caracas, 24 m., British owned, as are also the 34 m. from Puerto Cabello to Valencia. From Caracas to Valencia, 111 m. are under German ownership; other lines are from Encontrada on Lake Maracaibo inland, one to Truxillo, and one to Barquisimeto. In 1911 the exports of V. attained a value of £3,750,000; imports, £2,850,000. Imports were obtained from Great Britain and the colonies, U.S.A., and Germany in the proportion of 32, 26, and 19 per cent. respectively. Great Britain leads in cotton goods and agricultural machinery, U.S.A. in iron bridges and machinery. Of the population 10 per cent. are white, chiefly of Spanish descent; 70 per cent. mestizos, probably the largest proportion in any of the S. American states; the remainder Indians, negroes, and foreigners. Education is backward and ill organised. It is possible that V. may benefit by the opening of the Panama Canal, but the social conditions must be improved and developed before much progress can be made.

See *Foreign Office Reports* (annual); *Venezuela, Geog. Sketch, Natural Resources, Laws*, etc. (Bureau of American Rep., Washington, 1904); André, *A Naturalist in the Guianas*, 1904; T. C. Dawson, *The South American Republics*, 1905; A. H. Keane, *Central and South America*, 1909; J. M. Spence, *The Land of Bolívar*, 1878; C. R. Enock, *The Reps. of Central and South America*, 1913.

Venial Sin, in Roman Catholic theology, a sin that does not cut the soul off from God entirely. See also MORTAL SIN.

Venice (It. *Venezia*), a city of N. Italy, cap. of prov. of same name, 45° N., 12° E. It is built on an island, intersected by canals, in the lagoon to the W. of the Gulf of Venice at the head of the Adriatic. V. was noted for its textile manufactures as early as the 15th century; the principal manufactures at the present time are tapestry, brocades, Venetian laces, wood-carving, artistic wrought-iron work, jewellery, bronzes, machinery,

and clocks, and at Murano glass and glass beads. Its trade is mostly in transport, chiefly to the E.; in 1910 the ships entered and cleared numbered 4353, of a total tonnage of 2,200,000. The pop. in 1911 was 160,719. The distinctive features of V. are its situation in the lagoon and the canals by which it is intersected, and by which all bnt foot traffic is conducted. Of its public buildings the following are the principal: the Ducal Palace, standing on the site of a former official residence of the Doges, which was burnt in 976. Besides its painted ceilings and walls, there are many pictures by the Italian masters; the Accademia, whose twenty rooms are filled with some of the finest works of the Old Masters; the Museo Civico with its collection of antiquities. Its churches, amongst which the principal are St. Marco, St. Giorgio Maggiore, and Sta. Maria della Salute, are all most highly decorated with frescoes, mosaics, and carvings, besides containing many world-famed pictures. The Campanile of St. Marco has been rebuilt since its fall, on July 14, 1902, after standing a thousand years. The palaces of the nobility on the Grand Canal and other canals contain priceless collections of pictures. The Arsenal contains many models of the old Venetian ships, armour, collections of weapons, and spoils of war.

The arts in Venice.—The earliest art in V. was Byzantine, and V. lagged behind other Italian cities in forming a native style, but her masons, mosaicists, and glass workers soon became world famed. Amongst the foremost painters of the Venetian school are: Antonio Veneziano, the Vivarini, Jacopo Bellini and his sons and pupils, Carpaccio, Giorgione, Titian, Palma Vecchio, Sebastiano del Piombo, and Pordenone. During the 15th century printing flourished in V. to such an extent that more books came from its presses than from Rome, Milan, Florence, and Naples together, and the name of Aldus Manutius stands for the finest work of his time as well as for the greatest output.

History.—The history of V. commences with the inhabitants of the plain to the N. of the Adriatic taking refuge from the incursions of barbarian tribes in the islands of the lagoon, first as a temporary measure in about 452. In 466 they took the first steps towards a corporate existence, and it was not till 568 that they abandoned the idea of a return to the mainland. At first the community were spread over twelve townships on various islands, of which Rialto, now V., was not the most im-

portant. After generations of struggle with the Lombards and the empire, V. became not only the greatest maritime power in Italy, but one of the most powerful in the world trading with the far East and their imports throughout

Europe; founding colonies and factories in the Morea, at Constantinople, and in many of the coast towns of Syria, and acquiring territory on the mainland, extending from the Adriatic to the Alps between the Mincio and the Po on the W., and the Isonza on the E. During this period she found a strong rival in Genoa, the next important of the Italian maritime states, and had to protect her shipping from the Dalmatian pirates, besides having many encounters with the empire and neighbouring mainland states. She took a leading part in the transport of the Crusaders to the Holy Land, and made vast sums out of this and her trading transactions. In the latter half of the 15th century, after gallant struggles, her decline commenced, of which the chief causes were the Turkish conquest of Constantinople, the discovery of the Cape route, and the rise of the great European powers and their dominance in Italy generally; but the end did not come till 1796, when Napoleon after the war with Austria, took possession of the town.

See J. Ruskin *Stones of Venice*; M. tel.
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chiefly compiled.

Venice, Gulf of, the N.W. arm of the Adriatic Sea, on which is situated the city of Venice.

Veni Creator Spiritus ('Come, Holy Ghost'), an early and very famous hymn for Pentecost, generally ascribed to Gregory the Great. The translation in the Prayer Book ordination service is ascribed to Cranmer.

Venlo, a fortified tn., prov. of Limburg, Holland, on the Meuse, 43 m. N.N.E. of Maastricht. Has narrow, winding streets. Pop. about 14,399.

Venn, Henry (1725-97), an English evangelical divine, born at Barnes and educated at Cambridge. Was ordained in 1747 and became successively curate of Clapham, and vicar of Huddersfield, and of Yelling in Hunts. He wrote *The Compleat Duty of Man*, 1763; and *Mistakes in Religion*, 1774.

Vennachar, Loch, in Perthshire, Scotland, 2 m. S.W. of Callander. It is 3½ m. long.

Venomous Bites. Some snakes are provided with poison-glands con-

ected with grooved fangs. One lizard, the heloderm of N. America, has poison-glands. Centipedes have poison-sacs connected with the jaws. Snakes paralyse their prey by stabilising on-claws. Gnats and

provided with poison-glands in the mouth, but the greatest danger from insect bites is the possibility of bacterial or protozoal infection. Insect poison is usually formic acid, and may be counteracted by an immediate application of ammonia. The best treatment for snake-bite is the injection of antivenom.

Venosa, a tn. in prov. of Potenza, Italy, the birthplace of Horace, 52 m. S.S.E. of Foggia. Pop. about 8503.

Venta, the name of three cities of ancient Britain—Venta Belgarum, with which Winchester is identified; Venta Icenorum, probably Caistor on the Wensum, near Norwich; and Venta Silurum, near the site of the Caerwent, in Monmouthshire.

Venti, the winds, represented in classical mythology as the servants of Æolus who shut them up in his cave and only released them at his pleasure. The chief winds were Zephyrus (W.) of the springtime; Notus (S.); Boreas (N.) of snow and tempests; Typhon, a destructive wind, the son of Typhæus; and Africus. They were represented in art as human bodies, with wings at the heads and shoulders.

Ventidius, Bassus Publius (fl. 1st century B.C.), a Roman general, born at Picenum. He began life as a mulctee and chairman; but was noticed by Cæsar, under whom he served in the Gallic and civil wars, and became tribune and senator. In 43 B.C. he was elected consul, and in 39 joined Labienus in Asia and defeated the Parthians in three great battles. He celebrated his triumph in Rome in 38 B.C.

Ventilation. Pure air and good food are necessary to human life, and it is possible by adequate means of V. to obtain that amount of pure air which is

lives. Air is composed chiefly of oxygen and nitrogen, but it is upon the oxygen that the heat and energy of our bodies depends. It is also found

The late Sir that 1½ parts percent. produced nausea, depression, and headache. The permissible quantity is about 16 parts per 1000 cubic ft. Gas while burning is a great polluter of the air, and it has been found that 8 cubic ft. of air is consumed by 1 cubic ft. of gas, as well as producing other impurities from the combustion of gas. It has been found

that 1000 cubic ft. of air contain '4 part of carbonic acid gas, and the breathing of persons produces on the average about '6 parts per 1000 cubic ft. These added together make 1'0 cubic ft. per 1000 cubic ft. of air. This is in excess of the standard mentioned above, namely, '6 per 1000 cubic ft. Each person requires 3000 cubic ft. of pure air per hour, and it is necessary to change the air several times during the hour to obtain this amount. This is the object of good V. Care must be taken to prevent draughts, and air that travels at a greater rate than 2 ft. per second will produce draughts. In practice it has been found impossible to obtain the above amount of air per person, and the following are the amounts usually adopted for practical purposes: Cottages, 250 cubic ft. per person; houses lot in lodgings, 300 cubic ft. per person (for sleeping only); dairies, etc., 600 cubic ft. per cow; factories and workshops, 250 cubic ft. per person; factories and workshops (for overtime), 400 cubic ft. per person. A careful examination of many of the houses of the poorer quarters, and indeed of the better class, discloses the fact that a great number are overcrowded. Schools, 100-240 cubic ft. per child; public halls, 1200-1500 cubic ft. per person; hospitals, 1200-3000 cubic ft. per person. Two methods of V. are adopted: (1) natural; (2) artificial; and in each method due regard is made to the lighting and heating. In a short article like this it is impossible to deal with each system in any great detail.

1. *Natural ventilation*.—This is conducted by means of inlet and outlet tubes by natural methods. *Inlet tubes*.—These should be as free from bends as possible, and should be so arranged as to deliver the air into the room at a height of about 6 ft. so as slightly to warm the incoming air before it reaches the heads of the occupants. The size of the opening should be based upon about 24 sq. in. per occupant. Many inlet devices are upon the market, among them being the Tobin tube, Sheringham and Leather inlet valves. *Outlet tubes*.—Hot air always rises and outlet tubes should be placed high up in the room, and as far away from the inlets as possible. The provision of inlets should be slightly in excess of that of the outlets.

2. *Artificial ventilation*.—This is the system by which the air is propelled into the room or the foul air extracted from a room by mechanical means. There are two systems adopted: (1) the plenum; (2) the vacuum. *The plenum* consists of forcing purified air into the rooms by fans or air

pumps, thus forcing out the foul air. *The vacuum* system is worked by using exhaust pumps, gas jets, or furnaces for extracting the foul air from the rooms and allowing the fresh air to take its place. When air is propelled into a room it should be slightly heated, and if it is to be used for a number of rooms, heating coils should be used to warm the air before it enters the rooms. Messrs. Boyle's system of V. has proved very effective and is used to extract the foul air by means of an exhaust ventilator in the roof, giving place to the fresh air which is admitted by inlet tubes and which can be purified by passing through cotton wool, and also be heated by having a small heating coil in each ventilator.

Fans.—Fans are used both for extracting the air from and for propelling the air into a room. The Blackman fan is a very powerful extractor as is also the Stott fan. By the use of fans of given power, the exact amount of air can be produced or extracted. The number of persons

The.—This is effected by withdrawing the foul air from the tunnel at a point or points midway between the ends, and propelling fresh air into the space by means of powerful fans.

Ventimiglia, a tn. of Liguria, Italy, 9 m. W. by S. of San Remo. Has a fine Gothic cathedral, and the celebrated Balzi Rossi grottoes, containing palæolithic remains. Pop. about 3452.

Ventnor, a tn. in the Isle of Wight on the S. shore. The climate is mild and suitable for invalids and consumptives. In summer it is a pleasure resort. The National Consumption Hospital is just outside the town.

Ventriculites, a genus of fossil sponges with a funnel or top-shaped cup. They are most abundant in the Cretaceous system.

Ventriloquism, the art of speaking in such a manner that the sound appears to be produced at a distance from the speaker. The origin of the word, from *venter*, belly, suggests that the voice was supposed to proceed from the speaker's stomach. The words are, however, produced in the usual manner, though some consonants may be masked by the immobility of the lips and teeth and the restricted use of the tongue. The art was practised by the ancient Greeks and Egyptians, and has had various uses, from mere entertainment to religious charlatany.

Venue. In an indictment the V. is the statement of the county or other geographical division from which the sheriff has summoned the grand jury

by whom a 'true bill' has been found (see INDICTMENT, and JURY), and also, as a rule, the place where the crime was committed. As tho V. should, by the common law, be tho jurisdiction within which was committed, tho trial takes place there too.

general rule there are exceptions, e.g. offences committed by persons on a British ship (see MERCHANT SHIPPING Act) may be tried in any county where the offender is in custody, offences against the Customs Acts are triable in any county; again the V. as to forgery, bigamy, larceny, or embezzlement by public servants may be laid either in the county where the crime was committed, or in the place of arrest; and there are special rules applying where the offence was committed partly in one and partly in another county.

Venus, the most conspicuous and brightest planet. *Phosphorus*, the morning, and *Hesperus*, the evening star, was its name among the Greeks. It is visible in daylight. It moves at a mean distance from the sun of 67.2 million miles in an orbit of less eccentricity, .007, than that of any other planet, at a velocity of 22 m. per sec.; the revolution is completed in 225 days, sidereal period, its synodic period being a year and seven months. Its arc of retrogression is 16° , the inclination of its orbit $3\frac{1}{2}^\circ$. The apparent diameter varies from 11 to 67 sec., its distance from the earth varying from 26 to 160 million miles. The real diameter is 7700 ± 30 m., tho planet being practically the same size as the earth therefore, and her mass is 82 per cent., density 88 per cent., superficial gravity, 85 per cent. that of the earth. Owing to her position within the earth's orbit V. exhibits phases; the discovery of tho Gibbons phase by Galileo in 1910, being one of the facts which disproves the Ptolemaic system, and supported that of Copernicus. The transit of V., its passage across the sun's disc at inferior conjunction, is a rare phenomenon, and occurs at or about either June 5 or Dec. 7; actual past or future dates are Dec. 7, 1631; 4, 1639; 9, 1874; 6, 1882; June 5, 1761; 3, 1769; 8, 2004; 6, 2012. Horrox and Crabtree in England were the first (1639) to observe a transit, since then they have been specially observed elaborately by scientific expeditions to the best stations. Tho matter is of great importance as one of the important means of determining the parallax (q.v.) of the sun. *Surface markings*.—Nothing is yet determined with any certainty, but it is quite possible there are ice caps and mountains. Mr. Lowell is here, as in

the case of Mars, very much more decided in his presentation of evidence. Bright spots at the cusps and obscure, but possibly definite, markings near the rather shaded terminator together with irregularities in the bases of any de-

The undoubted presence of an atmosphere renders observation difficult; a thin line of light when the planet is near the sun, and extension of the horns beyond the diameter indicate an atmosphere, but less extensive than that of the earth. Faint lights on the dark portion of V. have also been recorded. Tho rotation period is still undecided. Schroeter gives 23 hrs. 21 min., but Schiaparelli and Lowell (1896) give 225 days, the period thus corresponding with that of revolution as in the case of the moon. Tho longer period is supported by the fact that no sensible difference has been observed in the lengths of diameters of tho planet.

Venus, see APIMODITE.

Venusberg, in German mythology, a cave palace among the mountains, where Venus held her court. The knight Tannhäuser dallied there until he was satiated with its sensuality. He later received absolution from Pope Urban.

Venus's Looking-glass (*Specularia speculum*), a campanulate plant with purple flowers often grown in garden borders and beds.

Vera, a tn. of Navarra prov., Spain, cap. of dist. of same name. Is a small port.

Vera, Augusto (1813-85), an Italian philosopher, born at Amelia in Umbria.

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of *Introduction à la Philosophie de Hegel*, 1855, and *Strauss et l'Ancienne et la Nouvelle Foi*, 1873. See monograph (1887) of Maritano.

Vera Cruz, a state and seaport town in Mexico. The state extends for a distance of about 435 m. along the Mexican coast, N.W. to S.E., and covers an area of about 29,201 sq. m. It is watered by several rivers, mostly navigable, and there are several ports on the coast. Tho climate is hot; and the chief products are coffee, sugar, cotton, rum, and tobacco. Jalapa is the capital of tho state, of which the pop. is about 981,030. The city of V. C. is situated on the Gulf of Mexico, and is the chief port of the republic, being connected by rail with Mexico city. It has wide, well-kept streets and a fine cathedral, but occupies an unhealthy site in the midst of marshy or arid ground. Tho harbour was greatly improved at the end of the last century. Tho

chief industry is fishing. Pop. about 29,164.

Verapoli, a tn. of Madras, India, in the Travancore state, 9 m. N.E. of Cochin. It is the seat of a Carmelite mission and of the vicar-apostolic.

Veratrine, a poisonous crystalline powder derived from *sabadilla* seeds by bruising, boiling in alcohol, and precipitation with an alkali. It is sometimes used externally as a local anæsthetic.

Veratrum, or False Hellebore, a genus of perennial plants (ord. Liliaceæ) with decorative leaves, and panicles of white, green, or purple flowers. *V. album* yields the poisonous powder known as Hellebore powder, which is mixed with water and used as an insecticide.

Veraval, a seaport on the S.W. coast of the Kāthiāwār Peninsula, India, 40 m. N.W. of Diu. Pop. 17,500.

Verbascum, see MULLEN

Verbena, or Vervain, a genus of herbaceous plants and shrubs. *V. officinalis* is the common British wayside plant, with slender spikes of small lilac flowers. A number of species are grown in the garden, as well as numerous hybrids. The lemon-scented *V.* is *Lippia* or *Aloysia citrodora*.

Verbenaceæ, a natural order of trees, shrubs, and herbaceous plants, mostly tropical. The most important is teak (*Tectona grandis*). Many species are fragrant.

Verbeeckhoven, Eugen Joseph (1799-1881), a Flemish painter, born at Warneton in W. Flanders. He chose his subjects principally from peasant and outdoor life, and was particularly skilful in painting sheep and cattle.

Vercelli (ancient *Vercellæ*), a tn. with considerable commerce in rice, on the Sesia, 12½ m. S.W. of Novara by rail, in Piedmont, Italy. The library contains the valuable *Codex Vercellensis* (q.v.), and there is a 16th century cathedral. Pop. (1901) 17,922.

Vercelli Book, or Codex Vercellensis, an Early English MS., which was discovered in 1822 by Dr. Friedrich Blume, a German jurist, in the cathedral library at Vercelli (q.v.). It appears in C. W. M. Grein's *Bibliothek der A.S. Poesie*, vol. ii. (Leipzig, 1904). Besides six homilies and a prose 'Life of Guthlac,' it contains six poems, including 'Andreas,' the 'Dream of the Rood,' and an 'Address of the Soul to the Body.'

Vercingetorix, a brave Gallie champion, who, as chieftain of the Arverni, boldly defied Cæsar till he fell into his hands on the capture of Alesia (52 B.C.). After adorning Cæsar's triumph of 45 B.C., he was put to death.

Verd-Antique, the old French name for what the Romans called *lapidis atracius*, from Atrax in Thessaly, its place of origin. It is a fine green serpentine mixed with limestone, variegated often with brown or white patches. The columns of the Lateran basilica are composed of this stone.

Verde, Cape, see CAPE VERDE ISLANDS.

Verden, a tn. with breweries and cigar factories, 21 m. by rail S.E. of Bremen on the Aller, in Hanover, Germany. There is an ancient Gothic cathedral. Pop. less than 10,000.

Verdi, Giuseppe (1813-1901), an Italian composer, born at Parma, studied under Provesi and Lavigna; first opera, *Oberto* (1838), given at La Scala, Milan, with great success, followed by *Ernani* (Venice 1844,) and several others. Just before 1850, he travelled to London and Paris; on his return to Italy he wrote: *Rigoletto*, 1851; *Il Trovatore*, 1853; *La Traviata*, 1853; *Un Ballo in Maschera*, 1859; and *Don Carlos* (Paris, 1867). Under the influence of Wagner, *V.* excelled his previous efforts by *Aida* (Calro, 1871); *Otello*, 1887; and *Falstaff*, 1893. *V.* formed the connection between Rossini and Wagner, and his tradition was followed by Puccini. His *Mazzini-Requiem* (1874) must also be mentioned. See *Life* by Sir A. C. Mackenzie, 1913.

Verdict. In civil trials, the jury, after the judge has summed up the evidence, determine by their *V.* all issues of fact, and, if they find for the plaintiff, assess the damages. Damages are said to be 'liquidated' when the jury can arrive at the amount by mere arithmetic or calculate them according to a scale of charges or some other accepted rate or percentage (see Odger's *Principle of Pleading*). But when the amount is arrived at after consideration of all the circumstances, including the conduct of the parties, the damages are 'unliquidated.' In this latter case they may be *contemptuous*, when the jury think the plaintiff ought never to have brought his action; *nominal*, when, though the plaintiff was justified in suing, but has suffered no special damage, and has sued rather to clear his character or establish a right; *substantial*, when the plaintiff is entitled to fair compensation; and *vindictive*, when the jury desire to punish the defendant by making an example of him (this is only permissible in actions of breach of promise, libel, seduction, assault, malicious prosecution, false imprisonment, trespass, and slander). In criminal law *Vs.* are said to be either (1) *general*, i.e. guilty or not guilty; or (2) *partial*, i.e. guilty on one

count (see INDICTMENT) and not guilty on the rest; or (3) *special*, i.e. where the jury finds a certain state of facts and leaves it to the judge to decide upon those facts whether the offence charged has been committed. In Scots law there is a middle V. of *non-proven*, but English jurisprudence has never favoured any rule that militates against finality one way or the other in criminal trials. Where the jury cannot agree they must be discharged and the accused is then tried before a new jury. If a juror dies or is taken ill a similar result follows. Before a jury arrives at a V. they ought to satisfy themselves (a) that the facts are satisfactorily proved; and (b) that the circumstantial evidence (see EVIDENCE) is not only consistent with guilt, but is inconsistent with any other reasonable conclusion.

Verdigris, a poisonous pigment, consisting of basic copper acetates. It is used as a green or blue paint, and also in dye-works. The formula of blue V. is $\text{CuO}_2 \cdot \text{Cu}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 6\text{H}_2\text{O}$.

Verditer, a basic copper carbonate obtained when sodium carbonate is added to a solution of copper sulphate. It is greenish blue in colour, but is little used as a pigment as it is very poisonous and liable to discoloration.

Verdun, a tn., with sweet, liquor, nail, and rope factories, and a canal commerce in agricultural produce and timber, on the Meuse, 40 m. W. of Metz., in the dept. of Meuse, France. A first-class fortress, V. faces German Lorraine with sixteen detached forts and twenty smaller works. The cathedral of Notre Dame is not very ancient; but the bishopric, the most famous occupant of which was St. Vanne (d. 525), goes back to the third century. It was here that the treaty authorising the three-fold partition of the Frankish empire was signed in 843. Pop. (1906) 12,837.

Vere, Sir Aubrey de, see DE VERE, SIR AUBREY.

Vere, Aubrey Thomas de, see DE VERE, AUBREY THOMAS.

Vere, Sir Francis (1560-1609), an English soldier, brought up by Sir William Browne. His whole life from 1585 to 1604 was engrossed in active service, chiefly in the Low lands. He played a gallant part in the defence of Sluys (1587), the relief of Rheinberg (1589), the fights at Breda (1589) and Groningen (1594), the victories at Turnhout (1598) and Nieupoort (1600), and the defence of Ostend (1601-2). Moreover, he shared in the success of the Cadiz expedition (1596).

Vere, Horace, Baron Vere of Tilbury (1665-1635), an English soldier, was brother to Sir Francis V. (q.v.). As

commander of the English troops in Holland (1604) he recovered Sluys. In the Palatinate he was obliged to surrender to Tilly at Mannheim (1622).

Vere, Robert de, ninth Earl of Oxford (1362-92), an English great chamberlain, is notorious as one of the many favourites of Richard II. Being charged with treason by the lords appellant (1387), he made a futile effort to raise the standard of revolt and eventually died abroad.

Vereeniging, a tn. in the extreme S.E. of the prov. of Potchefstroom, in the Transvaal, S. Africa. It is connected by rail with Pretoria and Bloemfontein. There are collieries here. It was the Treaty of Vereeniging (1902), which concluded the S. African War.

Vereshchagin, Vassili (1842-1904), a Russian painter, graduated first in the list from the naval school of St. Petersburg, but subsequently studied art in that city and in Paris. A restless spirit all his days, he fought under Kauffmann during his Turkestan campaigns (1867), visited India, the Himalayas, and Tibet (1873), went through the Russo-Turkish War of 1877, travelled in Palestine and Syria (1884), was at the front during the Sino-Japanese War (1894), and finally perished with the flagship *Petropavlovsk* during the struggle between his country and Japan. His sensational pictures were painted with a view to disgusting people with warfare by confronting them with its horrors.

Vorga, Giovanni (b. 1840), an Italian novelist, a native of Catania, Sicily. According to Mr. Richard Garnett, his books will in time to come be treasured 'among the most valuable documents for the social history' of that island. His *Novelle Rusticane* (1883) is the source of Mascagni's popular opera *Cavalleria Rusticana*; but his collections of short stories, *Vita dei campi* (1880) and *Medda* (1874), contain his finest sketches of the manners of Sicilian peasants, their savagery, humour, and passion for revenge. Many enjoy his novel entitled *Maestro Don Gesualdo* (1889).

Vergara, a cotton and linen manufacture 27 m. S.W. of San Sebastián, as with Deva, all, in Guipuzcoa,

Vergennes, Charles Gravier, Comte de (1717-87), a French statesman, was equipped for the post of foreign minister (which he received on the accession of Louis XVI., 1774), by over twenty years' practice in diplomacy. Constant hostility and ending feature

of his policy. Thus he spent more money than his country could afford in assisting the Americans in their War of Independence, and in 1777 eagerly recognised their new republic. He further gave his friendship to Austria and his support to Turkey, and at home was at daggers-drawn with Necker.

Vergil, *see* VIRGIL.

Vergil, Polydore, or 'De Castello' (c. 1470 - c. 1555), an Italian miscellaneous writer, spent the first and last years of his life in Urbino, his birthplace; but the middle and chief portion was passed in England (1501-50), where he was at first employed collecting Peter's pence for Pope Alexander VI., and where he was appointed archdeacon of Wells in 1508 and prebend of Oxgate in St. Paul's in 1513. The twenty-six books of his *Historia Angelica* in Latin (1533), which closes with the death of Henry VII., is still consulted as an original authority of value. His *Proverbiorum Libellus* (1493) is known by name to all readers of the *Letters of Erasmus*, whilst his *De Rerum Inventoribus* (1499) deserves mention as the first book of its kind.

Vergniaud, Pierre Vieturnien (1753-93), a French orator and revolutionist; dabbled in divinity, law, and commerce, before finally he found his true sphere of action, the National Assembly, whither he was sent in 1791. Here his impassioned yet reasoned eloquence led him to the leadership of the Girondists. The ominous speech of March 1792, in which he stooped to gloss over the excesses perpetrated at Avignon, fades away before that glorious oration of Dec. 1792, in which he urged an appeal to the people to decide the king's fate. With twenty-one fellow-Girondists he fell a victim to the Reign of Terror, and 'died unconfessed, a philosopher and patriot.'

Veria, a tn. of Macedonia, European Turkey, about 38 m. W.S.W. of Salonika. Pop. about 7000.

Veria, or Verria, *see* BERGA.

Verjuice, or Verges, an acid liquor, expressed from crab apples. It is added to cider to give greater roughness and tartness, and in France is fermented and sweetened to make a favourite drink in rural districts.

Verkhne-Dnieprovsk, a tn. in the gov. of Yekaterinoslav, Russia, about 34 m. W.N.W. of the town of Yekaterinoslav. Pop. about 10,000.

Verkhne-Udinsk, a tn. in Transbaikalia, Siberia, situated on the Trans-Siberian Railway. Pop. about 8000.

Verkhoyansk, a vil. on the Upper Yana R., in the gov. of Yakutsk, E. Siberia, Russia. The average winter

temperature is -53.1° F.; -79.5° F. has been observed. It is inhabited by Turkish-speaking Yakuts, and political exiles are also drafted here.

Verlaine, Paul (1844-96), a French poet, born at Metz. His lyrics are of the so-called impressionist type: half sensuous, half mystic, intensely beautiful in inspiration and subtle in rhythm, akin to the music of Debussy, who has set some of them, e.g. the *Fêtes Galantes*. His early paganism, responsible for such Baudelairean works as the *Fêtes Galantes* (1860) and *Poèmes Saturniens* (1866), was superseded by devout Catholicism, which came over V. during his imprisonment at Mons for shooting at the poet Rimbaud. *Sagesse* (1881) is on a level with the finest religious poems ever written. Other works: *Romances sans Paroles*, 1874; *Jadis et Naguère*, 1884; *Amour*, 1888; *Bonheur*, 1891, etc. *Life* by Le Pelletier (Eng. trans.), 1909.

Vermeer, Johannes (1632-75), a Dutch painter, was a native of Delft, playing a leading part in the Delft Guild. Besides his celebrated 'View of Delft' (Hague Museum) he executed many attractive genre pictures and some landscapes and portraits.

Vermejo, *see* BERMEJO, RIO.

Vermes, *see* WORMS.

Vermicelli, a staple food in Italy, and is so called because it consists of worm-like threads (from It. *vermicello*, a little worm), made from the granular meal of certain kinds of wheat.

Vermifuge, a medicinal agent for expelling worms. The most important is extract of male-fern. *See* ANTHELMINTICS.

Vermigli, Pietro Martire (1500-62), a Protestant theologian, was a native of Florence. He joined the order of Saint Augustine in 1516, and was eventually named visitor-general. He afterwards, however, embraced the views of the Reformers; becoming, in 1542, theological professor at Strassburg. He then visited Cranmer in England, where he was made a professor at Oxford, but he returned to Strassburg during the Marian persecutions. His last post was that of professor of theology at Zürich. Some of his works are collected under the title *Loci Communes*, 1583.

Vermilion, the red variety of mercuric sulphide, HgS. It may be obtained by subliming the black sulphide formed by triturating mercury and sulphur together in a mortar. It is also prepared by digesting the black amorphous sulphide for some hours in alkaline sulphides. V. is used largely as a pigment, but is commonly adulterated with ferrie

oxide and red lead. On heating, it readily sublimes, and this constitutes a test of its purity.

Vermin, a general term for noxious animals, perhaps most commonly applied to rats and mice, but frequently used of the insect parasites of man.

Vermland, or Karlstad, a län in the S.W. of Sweden, lying to the N. of Lake Vener and adjoining Norway. Capital, Karlstad. Pop. about 255,000.

Vermont, belongs to the New England group of the United States. It has an area of 9565 sq. m., and is remarkable in its group for having no seaboard. The name ('Verd Mont') has reference to the Green Mts. (highest peak, Mt. Mansfield, 4364 ft.), which traverse it from N. to S. First and foremost V. is an agricultural state, producing oats, maize, barley, hay, potatoes, and maple sugar. The quarrying of marble, granite, and slate is the most profitable industry, and after that lumbering and timbering. Metal founding, flour milling, and the manufacture of hosiery, other woollen goods, and paper are also important. The capital, Montpelier, is only the fourth city in point of size, Burlington being the largest. Pop. (1910) 355,956.

Vermouth, an aromatic fortified wine prepared in France and Italy. The basis of the beverage is a white wine of tonic properties, which is flavoured by the maceration of bitter herbs and fortified by the addition of alcohol. Sometimes the wine is distilled, but more often whole wine and distillate are blended to the required alcoholic strength. Italian V. is more syrupy than French V.; both are esteemed as slightly tonic in addition to their alcoholic properties.

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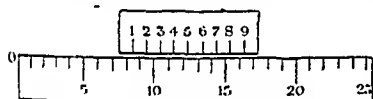
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VERNIER

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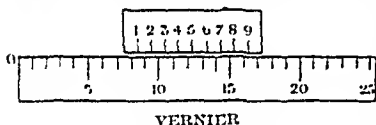
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of France, Sultan Soleyman I., and Charles V. of Spain as associates of Christ. He revelled in gorgeous banquetts, pageantry, and all the wealth of colour, apparel, and furniture that the material world can offer. Apart from the fine 'Vision of St. Helena' (National Gallery), his best paintings and frescoes are in the church of San Sebastiano and the Villa Masiera (Venice).

Veronica, or Speedwell, a genus of herbs and shrubs (order Scrophulariaceæ), a number of which are British, some common, some rare; one of the best known is brooklime (*P. beccabunda*) which occurs in ditches. Several species are grown in garden beds and shrubberies, and they are specially valuable on poor soil.

Veronica, St. (corruption of the Lat. *vera icon*, 'true image'), the name given to the woman whom tradition speaks of as having wiped our Lord's face with a kerchief on the road to Calvary. The name was first given to the 'true image' of the holy face which was miraculously imprinted on the kerchief, but was later ignorantly transferred to the woman herself.

Verrall, Arthur Woolgar (1851-1912), an English classical scholar, brought a brilliant and original mind to bear on the most beaten track of learning, namely, the classics. In 1874 he was admitted a fellow of Trinity College, Cambridge, and from 1877 was associated with that university as one of its most stimulating

lecturers. His essays were expressed in *Verri's Essays* (1895), which we know the essays and texts. Mr. Bayfield has attached a memoir to the essays of V. he has published (1913).

Verres, Gaius (c. 120-43 B.C.), a Roman propraetor of Sicily, notorious for his extortions and embezzlements. He first screened himself from prosecution by deserting Marius for Sulla, a more substantial protector; and secondly by betraying Dolabella, who in Cilicia was his abettor in venal practices. On his return from Sicily in 70, however, he had to stand his trial. Cicero brought such damning evidence against him that Hortensius, his counsel, refused to speak, and V. sought disreputable exile in Massilia.

Verri, Alessandro, Count (1741-1816), an Italian romancer, was a younger brother of Pietro (q.v.). He fashioned his stories out of his classical learning, and his *Saffo* and *Erostrato* were much read in their day. But his most famous work was *Le Notti Romane*, in which he imagines the spirits of

ancient Romans talking in the tombs of the Scipios.

Verri, Pietro (1728-97), an Italian historian, served in the Austrian army, and in 1765 became a member of the Council of Economy in Milan. His chief works are: *Memorie sull' Economia Pubblica dello Stato di Milano*, *Meditazioni sull' Economia Politica*, and *Storia di Milano* as far as the time of Charles V.

Verrio, Antonio (c. 1639-1707), an Italian painter, is described by Walpole as 'an excellent painter for the sort of subjects on which he was employed, that is, without much invention and with less taste.' Charles II. made over to him £5500 during the years 1676 to 1681, when he was employed decorating the ceilings and walls of Windsor Castle, and thought fit to introduce himself and Kneller in periwigs watching 'Christ healing the Sick.' His decoration of the great staircase at Hampton Court is poor.

Verrius Flaccus, a Roman grammarian of the time of Augustus, who appointed him instructor to his grandsons, Caius and Lucius. He died under Tiberius. Flaccus was the author of several grammatical works of which we still possess numerous fragments, including the *Fasti Prænestini*, and the abridgment of his work, *De Verborum Significatione*.

Verrochio, Andrea del (1435-88), an Italian artist, was 'goldsmith, master of perspective, sculptor, carver, painter, and musician' according to Vasari. The only authentic painting of his is the somewhat hard but forcible 'Baptism of Christ,' now in Florence, but it is of interest to note that both Lorenzo di Credi and the great Leonardo worked in his studio. As a sculptor his renown has a sure foundation in the magnificent equestrian statue in bronze of Bartolommeo Colleoni, which now adorns a piazza of Venice. This was cast from Verrochio's model by Leopardi and unveiled in 1496.

Versailles, a town in France, about 10 m. S.W. of Paris. Its inhabitants number some 45,000, and the place is chiefly notable on account of its palace. This consisted originally of a mere château, erected by Louis XIII.; but in 1670 Louis XIV. conceived the idea of augmenting the building, and he commissioned the architect Le Vau to proceed accordingly. This architect was succeeded anon by Mansart, who in turn was followed by De Cotte; while the gardens were designed by Le Nôtre, and the decoration of the interior was supervised by Le Brun. Louis XV. lived frequently at the palace, and since then it has been the scene of

many historic events. Here, in 1783, Britain came to terms with her American colonies; while it was here again in 1871 that the capitulation of Paris was signed. Prior to this V. had been turned into a public museum, and it contains a great array of pictures done in Napoleon's time; notably some by Louis David, and others by Isabey, Vernet, and Gros. See Nolhard, *La Création de Versailles*, 1901.

Verse, a concourse of words so arranged as to give a metrical or rhythmical effect. 'V.' is figuratively derived from the turning of the plough (from *vertère*, to turn), which produces a line or furrow. A V. is strictly 'a series of rhythmical syllables, divided by pauses and destined in script to occupy a single line.' In English the word 'V.' is loosely used of metrical composition as opposed to prose; and the singular V., as well as the more correct Vs., is used of a collection of several lines of poetry. The Greeks and Romans made their versification depend on the way in which long and short syllables succeeded one another, that is, on quantity—whereas in modern languages rhythm is dependent on stress or accent. Definite combinations of syllables are called 'feet.' It is a convention in English prosody to use the classical names for the various feet, this being made possible by the assumption that an accented syllable is equivalent to a long syllable, and unaccented to a short one. The following quotations exemplify the best-known feet:—

- (1) spondee - - and dactyl - - -
(a) 'Ármá vj | rúmquē cā | nō;
Trō | jāē qū | primús āb | ōis'
N.B.—marks the 'caesura' or pause.
- (b) English daetyls:
'Bird of the | wilderness |'
- (2) iamb - - and trochee - - -
(a) 'The lá- | dy óf | Shalótt |'
(iambic)
- (b) 'In the | middle, | leaps a |
fóuntain | (trochaic)
- (3) anapaest - - -
'As they roá | on the shóre |'
- (4) amphibrach - - -
Flow gēntly | sweet Áfton. |

The most common English V. forms are: (1) blank or unrhymed V.; (2) heroic couplet (rhymed); (3) the Spenserian stanza of nine lines closing with an Alexandrine; (4) octosyllabic V.; and (5) the sonnet of fourteen lines, which Surrey introduced from Italy. An illustration of (a) is *Hamlet*; of (b) The Prologue to the *Canterbury Tales*; of (c) the *Faerie Queen*; of

(d) *Marmion*; whilst Keats and Wordsworth are two of a host of sonneteers (e). Icelandic and Anglo-Saxon poetry relied on alliteration, section, and stress, for its rhythm.

Versecz, a tn. in the co. of Temes, Hungary, about 43 m. S. of Temesvár, having Roman remains. The chief products are wine and brandy. Pop. about 25,000.

Verst, a Russian linear measure equivalent to 1166½ English yards.

Verstegan, Richard (d. c. 1635), an English author and printer, was the son of a cooper of Dutch origin, and at Oxford became learned in Anglo-Saxon. Copper-plate engravings, illustrating the execution of the Catholic martyrs and taken from the author's own designs, give a curious interest to his *Theatrum Crudelitatum Hærdicorum*, 1585?

Vertebrates, or Backboned Animals, form a division of the animal kingdom which includes not only man and animals of similar structure (mammals), but also fishes, amphibians, reptiles, and birds. Vs. are characterised by the possession of a well-developed internal skeleton, and by forming breathing organs from the wall of the throat.

Vertigo, or giddiness, a sense of lack of equilibrium. It may be *aural*, connected with ear disturbances; or *ocular*, connected with eye disturbances; or *cerebral*, caused by disease or injury in the brain; or *gastric*, caused by digestive disturbances; or may be due to the introduction of toxic substances, such as alcohol, tobacco, etc., into the blood. The chief form of aural V. is that associated with Ménière's disease, which usually involves hæmorrhage into the labyrinth, leading to deafness and staggering. Ocular V. may be caused by squint, or such experiences as looking from a height, observing rapidly-moving objects, etc. Bodily disease of a generally debilitating tendency is always liable to produce V., and the treatment should depend upon the causative influence.

Verton, a tn. in the dept. of Loire-Inférieure, France, about 4½ m. S.E. of Nantes. Pop. (est.) about 5500.

Vertot, René Aubert (1655-1735), a French historian, born in Normandy. He was at first a member of the Capuchin order, then of the Premonstratenses. He gave up the religious life, however, and afterwards became a secular priest. His chief works are: *Histoire des Révolutions de Portugal*, 1689; *Histoire des Révolutions arrivées dans la gouvernement de la République Romaine*, 1719.

Vertue, George (1664-1756), an engraver and antiquary, born in London. He was a pupil of Michael van

der Gnecht, and afterwards was commissioned by Sir Godfrey Kneller to engrave many portraits. He also devoted his time to antiquarian research, and was a member of the Society of Antiquaries. The notes collected by him were used afterwards by Walpole in his *Anecdotes of* . . . in England.

Verulam, a tn. of Victoria co., Natal, about 19 m. N.N.E. of Durban. Chiefly engaged in the cultivation of the sugar cane. Pop. about 1000.

Verulam, Lord, see BACON, FRANCIS.

Verulamium, or Verolanium, was a British city of importance in the days of the Roman occupation. It was situated, as remnants of its flint rubble walls indicate, in the near neighbourhood of St. Albans, the site being now Old Verulam.

Verus, Lucius Aurelius, joint-emperor of Rome with Marcus Aurelius, his brother by adoption, from 161 to 169 A.D., seems to have emulated Nero in his debaucheries and sumptuous living. Despatched to prosecute the wars with Parthia (162) and against the Marcomanni, he left the work of conquest to his lieutenants, preferring the satisfaction of his own vicious tastes to the hardships of war.

Verviers, a tn. in the prov. of Liège, Belgium, about 14 m. E. of Liège and one of the chief centres of the woollen industry. Pop. about 49,000.

Vervius, a tn. and the cap. of an arron. in the dept. of Aisne, France, about 22 m. N.E. of Laon. Pop. (est.) about 3000.

Vesalius, Andreas (1514-64), a Flemish anatomist, was the son of Emperor Maximilian's apothecary; and himself became in 1514 chief physician to Emperor Charles V., and later of Philip II. of Spain. Louvain and Paris were the scenes of his studies, whilst he was afterwards professor of anatomy at Pavia, Bologna (1543), and Pisa. Discovery after discovery followed his careful dissections of human bodies; and whilst his progress disgusted Fallopius and the whole pedantic tribe of contemporary anatomists, it enabled him the more freely to expose the deficiencies of Galen, their oracle. *De Corporis Humani Fabricâ Libri Septem* (1543) is his magnum opus.

Vesicant, see BLISTER.

Vesicaria, a genus of cruciferous annuals and perennials with yellow flowers followed by bladder-like seed pods.

Vesinet, Le, a tn. in the dept. of Seine-et-Oise, France, about 2 m. E.S.E. of St. Germain. Pop. (est.) about 5000.

Vesoul, a tn. in the dept. of Haute-Saône, France, situated near the R.

Durgeson. It produces wine. Pop. (est.) about 10,000.

Vespasian, or Titus Flavius Vespasianus, Roman emperor (70-79 A.D.), born in Reate in the land of the Sabini, his father being a humble tax collector. He owed his rapid rise and his military genius; and to note that in 43, as

legatus legionis in Britain, he reduced the Isle of Wight. Nero disliked him, but could not dispense with his services; and thus V. was in Judæa, where he had been sent in 66 to conquer the Jews, when tidings reached him of his proclamation as emperor (69). Vitellius, his rival for imperial honours, was defeated by Antonius Primus; and, largely owing to the support of Mucianus, V. was soon firmly established on the throne. A successful termination, the work of Cerealis, to the war with the Batavi (70); the reduction of N. Wales by Agricola (78), and the conversion of the Kingdom of Commaxene into a Roman province, are conspicuous in the foreign history of this reign; whilst at home may be noted the expulsion of the philosophers and the execution of Helvidius Priscus the Stoic (73), the execution of Julius Sabrinus and his wife (79), the rebuilding of Rome and the maintenance of peace and order. In V.'s own character it is his simplicity and contempt for outward shows, his common sense, and his private avarice coupled with a public bounty, which impress. Of his two sons, Titus and Domitian, both of whom succeeded him, the former alone inherited the father's virtues.

Vespers, the evening service in the Latin Breviaries. It has always five psalms. See BRUARY.

Vespers, the Sicilian, the name given to the famous insurrection which took place at Palermo on Mar. 31, 1282, and which ended in the massacre of all the French (under Charles of Anjou) in the island, and the declaration of independence. The prime instigator of the revolution was Giovanni da Procida (q.v.), who had been preparing it for twelve years, but was not actually in Sicily when it took place. He was aided by Queen Constance of Aragon, Peter III. of Aragon, and many other Ghibellines exiled from Sicily by Charles. One of the greatest events in the history of the time, its romantic story has inspired a tragedy by Delavigne (1817), and an opera by Verdi (1855).

Vespucci, Amerigo (1451-1512), a navigator, was a native of Florence. He began his career at Seville as a merchant; but his interest in Columbus induced him to abandon this profession, and he set sail for the New World in 1499. He is the discoverer

of All Saints' Bay, Brazil, and has given his name to the New World in spite of the success of Columbus, his predecessor.

Vesta, was the Roman goddess of the hearth, and thus corresponded exactly with the Greek goddess 'Hestia.' From Lavinium, whither Æneas had brought, from Troy, the sacred fire of V. as well as the Penates, her worship was introduced to Rome by Numa; and it was he also who erected her central place of worship, namely a small round temple with a vaulted roof, in the Forum between the Palatine and Capitoline hills. In this shrine her fires were kept burning by the Vestals, her virgin priestesses (*q.v.*). At the 'Vestalia,' which was celebrated on June 9, until the very twilight of paganism (382 A.D.), matrons walked barefooted to her temple, carrying homely dishes for sacrifice.

Vesta, a minor planet discovered in 1807 by Olbers of Bremen, was the fourth in order of discovery, and is the brightest, being the only one visible to the naked eye, and as bright as a 6th magnitude star. It has the greatest albedo, and a diameter of 250 m. (Damond), 214 m. (Farley). Revolution is performed in 3.63 years at a mean distance of 219 million miles.

Vestals, The, or *Virgines Vestales*, were the six priestesses of Vesta (*q.v.*), who maintained the ritual and worship of that goddess in her temple at Rome. They were chosen by lot from a list of twenty maidens of free and worthy parentage, selected by the pontifex. Their term of service was at least thirty years—the years of learning and initiation, ten years of actual ministration, and ten years for imparting their lore to neophytes. The violation of a V.'s vow of chastity was punishable by death, whilst a harsh retribution speedily followed if any virgin were so careless as to let the sacred fires go out.

Vesteras, a tn. and the cap. of the län of Vestmanland, Sweden, about 55 m. W.N.W. of Stockholm on Lake Mälär. It is an old town, with a cathedral and an episcopal library. Pop. about 14,000.

Vesterbotten, a län of Sweden, extending from the Gulf of Bothnia on the E. to Norway on the W. Pop. 161,372.

Vesternorrland, a län of Sweden, having on its E. the Gulf of Bothnia. The capital is Umeå. Area, 9840 sq. m. Pop. 250,517.

Vestervik, a seaport in the län of Kalmar, Sweden, about 75 m. N. of Kalmar, situated on the Baltic Sea. Pop. 9970.

Vestmanland, a gov. of Sweden, W.

of the gov. of Upsala. Capital, Vesterås. Area 2620 sq. m. Pop. 155,925.

Vestments, Sacred, have been worn by the priesthood from time immemorial. The regulations with regard to those of the Jewish priests were extremely minute, but in spite of apparent resemblances no connection can be traced between these and the Christian vestments. These last are no more than the ordinary dress of ancient times, which was retained by the clergy long after it had fallen out of ordinary use. The Mass vestments for a priest in the Western Church are: amice, alb, girdle, stole, maniple, chasuble. At other solemn services and in processions a cope is used. At choir offices and other occasions the clergy wear a surplice, sometimes in the English Church with the addition of a scarf and university hood. A stole is worn in the administration of the sacraments. The garments in the Greek Church differ somewhat from these. See articles on each vestment named.

Vestris, Lucia Elizabeth (*née* Bartolozzi) (1797-1856), an English actress, married A. Vestris, an actor, 1813. Sang in Italian opera in London and Paris. Made a great success as Tilla in *The Siege of Belgrade*, 1820, and acquired a considerable fortune. Appeared chiefly in light topera and pantomime.

Vestry, that part of a parish church in which the vestments and other movable ornaments are kept. Since such parts of the church have generally been used for holding meetings of parishioners for parochial purposes, such meetings, duly convened, have also acquired the name of Vs. It is the duty of Vs. to provide funds for the maintenance of the edifice of the church, and the due administration of public worship, and to elect churchwardens. In certain parishes, other special duties are added to these. Their conduct is regulated by common law and by a succession of Acts.

Vesuvianite, see **IDOCRASE**.

Vesuvius, a volcano, $7\frac{1}{2}$ m. E.S.E. of Naples, rising just now (1913) for a height somewhat over 4000 ft. from the eastern shores of the Bay of Naples, Italy. Monte Somma, the Mons Sarmianus of the ancients, is a great semicircular girdle of cliff to N. and E., parted from the eruptive cone by the valley known as Atrio di Cavallo, and itself the remnant of a massive wall which once shut in the huge cone of prehistoric times. Lava, scoria, ashes, and pumice-stone are the fabric of the mountain, which during activity emits a large assortment of minerals, such as augite, magnetic iron, leucite, hornblende

and mica. The amazing fertility of its slopes, on which especially those grapes luxuriate, from which the wine 'Lachrimæ Christi' is made, explains why for over twenty-five centuries V., in spite of its constant menace, has been the heart of a densely populated region. The historic records of the eruptions have induced geologists to treat V. as the great object lesson on volcanoes, and in 1844, at the expense of the Neapolitan government, an observatory was established, to which the researches of Melloni, Palmieri, and Montuoci have given a European fame. The destruction of the noble cities of Pompeii, Herculaneum, and Stabiae, the tragic death of the elder Pliny, and the graphic description of the disaster by his nephew, an eye witness, have cast an unending glamour over the eruption of '79. During those of 472 and 1631 particles of dust alighted in Constantinople, and during the eruption of 512 some actually reached Tripoli. Other years of remarkable activity were 1794, 1822, 1855, 1871, and 1906.

Veszprim, cap. of Veszprim co., Hungary, on the Séd, 69 m. S.W. of Budapest; has coal mines, iron works, and cattle markets. It has a castle, episcopal palace, and Gothic cathedral (16th century). Pop. 14,000.

Vetch, or Tare (*Vicia sativa*), a leguminous annual plant, with trailing or climbing stems, compound pinnate leaves, and reddish-purple flowers. In agriculture two races, winter V. and spring V., are known. The former is hardy and is sown in autumn to produce spring fodder. Spring Vs., which are more delicate and make more rapid and luxuriant growth, are sown from February onwards, and are cut for hay when in bloom. Numerous other species of the genus including the beautiful tufted V. (*V. cracca*) are common British plants.

Veterinary Science began in the Egyptian civilisation, and from the Egyptian's knowledge of the horse and its diseases the Greeks and the Romans learnt much. The Roman Vegetius (c. 300 A.D.) left writings on the subject, which in the 16th and 17th centuries were much studied. In the science, where the first established at the second at

Alfort, near Paris, in 1766. A Frenchman, St. Bel, founded the Royal Veterinary College in London in 1790, and it was another Frenchman, Lianlard, who first established a college in New York. Liverpool, Edinburgh, Glasgow, and Dublin now

each have colleges. In most countries the professional status of the veterinary surgeon is high and is protected by law. In Britain the Council of the Royal College of Veterinary Surgeons conducts professional examinations and grants degrees (M.R.C.V.S. and F.R.C.V.S.). Until 1881 the Highland and Agricultural Society granted veterinary certificates in Scotland, and holders of these were brought under the R.C.V.S. in 1900. With the increased attention to the eradication of disease from domesticated animals and the protection of public health, the services of the veterinary surgeon are in growing demand. All state departments of agriculture have their veterinary branches. In the British army regimental veterinary surgeons are incorporated in the Army Veterinary Corps, which has a school at Aldershot. A veterinary executive officer is attached to each cavalry regiment and mounted corps, and a cavalry regiment has twenty-two farriers and shoeing smiths. See Fleming's *Veterinary Obstetrics*, Thompson's *Veterinary Lectures*, and Courtenay's *Veterinary Medicine*.

Veto, a term applied to the right of a king or other chief magistrate or officer to withhold his assent to the enactment of a law, or, generally, of one branch of the executive of a state to reject the bills, resolutions, or measures of other branches. The term originates in the power of the tribunes of the plebs of ancient Rome to declare their protest against any unlawful measure, which they did by pronouncing the word 'veto' (forbid). In Great Britain the power theoretically belongs to the crown (*see Crown*). In the crown colonies the governor exercises the power (*see Colonial Governor*). In the U.S.A. the president can veto a measure of Congress; but notwithstanding his veto, the measure becomes law if subsequently carried by a two-thirds majority of each house. In Scots church history, the Veto Act was the name of an Act passed in 1835 by the General Assembly of the church, by which it was decreed that no one should be admitted a minister of any vacant church if a majority of the male heads of families should dissent. The decision of the Court of Session and the House of Lords that the Act was *ultra vires* led ultimately to the disruption of 1813.

Vetter, a lake of Sweden, connected with the Baltic Sea and Lake Vener by means of the Göta Canal. It is 75 m. long and just over 10 m. wide. Its water is most beautiful.

also dotted with islands, one of the chief being Visingsö.

Veullot, Louis (1813-83), a French journalist, born at Boynes (Loiret). He was entirely self-educated. He edited the *Echo de Rouen* (1831), the *Charte de 1830* (1837), and *La Paix*. He returned to Paris from Rome (1838) a violent supporter of Ultramontanism, and as editor of the *Univers* upheld the claims of the Church. In 1842 he became secretary to the Minister of the Interior. He published *Mélanges Religieux, Historiques, Politiques, et Littéraires*, 1857-76.

Vevey, a tourist resort in the canton of Vaud, Switzerland, situated about 11 m. E.S.E. of Lausanne on Lake Geneva. One of the chief buildings of interest is the church of St. Martin, in which is Ludlow's tomb. This town is also the scene of Rousseau's *Nouvelle Héloïse*. The chief manufs. are chocolate, watches, and infants' food. Pop. 13,596.

Vexatious Indictments Acts. The object of these Acts is to prevent unwarrantable prosecutions. Prior to the Act of 1859 private persons had an unlimited right to prefer an indictment to a grand jury without any previous inquiry into the truth of the accusation before justices in the police court. The above Act provides that no indictment can be preferred for certain specified *misdemeanours* (see CRIMINAL LAW), viz. perjury; subornation of perjury; conspiracy; false pretences; keeping a gambling or disorderly house; indecent assault; misdemeanours under the Debtors Act, 1869; libel and other offences under the Newspaper Libel and Registration Act, 1881; misdemeanours under the Criminal Law Amendment Act, 1885; and indictable offences under the Merchandise Marks (g.r.) Act, 1887, unless (a) the prosecutor has been bound by recognisance to prosecute or give evidence against the accused; or (b) the accused has been committed to or detained in custody or bound by recognisance to appear; or (c) unless the indictment has been preferred by the direction or with the consent in writing of a high court judge or a law officer of the crown; or (d) in the case of an indictment for perjury, the prosecution is by direction of a court, judge, or public functionary authorised by statute to direct such a prosecution. By the Vexatious Indictments Act, 1867, if the prosecutor chooses to be bound over to prosecute, a course open to him if justices refuse to commit, he may be condemned in costs unless he secures a conviction.

Vexilla Regis, see HYMNS—*Latin Hymnology*.

Vexjö, or **Växjö**, a tn., Kronoberg prov., Sweden, 63 m. W.N.W. of Kalmar; has iron foundries and match factories. The cathedral (1300) contains the tomb of St. Siegfried (d. 1030). Pop. 8311.

Vézelay, a vill., which in mediæval times was a populous city, on the Cure, 9 m. W.S.W. of Avallon, in Yonne, France. It is noted for its beautiful 12th century abbey church of St. Madeleine.

Vezin, Hermann (1829-1910), an actor, came from the United States to London in 1850, and soon became one of the leading Shakespearean actors in the metropolis, playing Hamlet, Shylock, Othello, and other classic rôles. In later days he acted less, but taught elocution. He was himself an excellent elocutionist.

Viadana, Lodovico, or **Lodovico Grossi** (c. 1565-1645), an Italian composer, was a native of Viadana. After entering a religious order he held the post of choirmaster at Fano, Venice, and Mantua. He is usually considered to be the inventor of the *basso continuo*. See *Life* by A. Parazzi.

Viaduct, see BRIDGE.

Via Mala, a gorge in the canton of Grisons, Switzerland, the original road being made about the year 1470, and the present one during the first half of the 19th century. It is at the beginning of the Splügen road; is 4 m. long, and flanked by rocks about 1600 ft. high. It crosses the Rhine three times.

Vianna do Costello, a seaport of Portugal, situated about 38 m. N.W. of Oporto at the mouth of the Lima. Pop. 10,000.

Viareggio, a seaport of Tuscany, Italy, about 12 m. W. of Lucca. It is a favourite resort and has good bathing facilities. V. possesses a monument of the poet Shelley, who was drowned near. Pop. (est.) 22,000.

Viaticum (Lat. 'provision for a journey'), the last communion administered to a dying person. It is then given daily when death is imminent.

Viatka, see VYATKA.

Viau (or Vaud), **Théophile de** (1590-1626), a French poet, born at Clairac. In 1616 he went to Paris and was attached to the household of the Duc de Montmorency. The publication (1619) of his *Cabinet Satirique*, with its strong Huguenot sentiments, forced him to leave Paris. He pretended to become a convert to Roman Catholicism, but the publication of his *Parnasse Satirique* (1623) led to his arrest and condemnation to death, a sentence afterwards changed to banishment. He also published *Pyrame et Thisbé*, a tragedy (1623),

and *Histoire Comique* (1621). His *Œuvres Complètes* (2 vols.) appeared in 1856.

Viaud, Louis Marie Julien, *see* LOTI, PIERRE.

Vibert, Jehan Georges (1840-1903), a French genre painter, born in Paris and educated at the Ecole des Beaux Arts under Barrias and Picot. Among his paintings are: 'L'Appel après le Pillage'; 'Un Couvent sans les Armes'; 'Portrait de Coquelin Aîné'; 'Le Récit du Missionnaire'; 'L'Ante-Chambre de Monseigneur'; 'Bailli de Suffren' for the Ministry of Marine; the 'Annunciation'; and 'Mater Dolorosa' for the Palais de Justice. He also wrote the dramas: *Tribune Mécanique*; *Les Chapeaux*; *Les Portraits*; and *Le Verglas*.

Viborg: 1. A gov. and its cap. in S.E. Finland. The government is in part plateau, and there are many lakes, including Lake Saima, which now communicates with the sea by Saima Canal. There are granite quarries and iron works, but the soil is poor. Area 13,530 sq. m. Pop. 422,000. The town, which lies at the head of Viborg Bay, in the Gulf of Finland, is the seaport for Karelia and E. Savolaks, and exports timber, iron, paper, butter, etc. The historic castle, erected in 1293, is one of many antiquities. There are machine shops and sawmills, besides foundries, but V. is better known as a tourist resort, the environments being most picturesque. Pop. 48,730. 2. An industrial and ancient city of Denmark, lies on Viborg Lake, 24 m. W. of Randers, in Jutland. Pop. 10,885.

Vibrio, a generic term for certain bacteria of spiral form.

Viburnum, a genus of deciduous and evergreen shrubs and trees (order Caprifoliaceae). *V. opulus*, the guelder rose, is an ornamental British shrub, with large white flower heads followed by pinkish berries which are eaten in parts of Europe. A variety of this is the snowball tree, a favourite garden shrub. *V. tinus* L. Lauristinus.

Vice-Admiralty Courts. These colonial courts exercising nearly same jurisdiction as the High Court of Admiralty in England; but they are not courts of record (*see* RECORD). Such courts are established by the Admiralty by commission under the Great Seal, and may be abolished in

India or having a prize, the navy.

the Privy Council from decisions of these courts.

Vicar and Vicarage. A vicar is one who holds a benefice as deputy of the rector, who may be a layman. The rector, therefore, receives a share of the emoluments of the incumbency. The position occupied by the vicar is sometimes called a vicarage, but this term is more frequently applied to the vicar's residence.

Vice-Consul, one who acts in the place of a consul. Vice-consular officers of the British Foreign Office are appointed in some cases by commission from the crown, in other cases by letter of authority of a superior consular officer.

Vicente, Gil, *see* GIL VICENTE.

Vicenza, a tn., the cap. of Vicenza prov., V.

of the I. 41 m. N. . . .

factures silk and woollen goods, leather, pottery, and musical instruments. Many of the fine buildings were designed by Palladio (d. 1580), a native of V. The Gothic cathedral dates from the 13th century. Pop. 45,000. The district of Sette Comuni in the N. of the prov. consists of Asiago, Enego, Fozza, Gallo, Lusiana, Roana, and Rotzo, whose inhabitants speak a German patois.

Vice-President, the next in rank to a president. As a rule the duties of a V. are necessarily nominal or dormant. In the U.S.A. the V. is he who automatically becomes president on the demise of the president during the latter's term of office.

Vicoroy, one who rules over a kingdom or country in the name of the king with regal authority. The title so far as England is concerned seems to be confined to the V. of India. The king's representative in Ireland, for instance, is styled the lord-lieutenant; in the Australian Commonwealth, the governor-general.

Vieh (Roman AUSA), a tn. of Barcelona prov., Spain, 38 m. N. of Barcelona. Pop. 15,300.

Vielva, *see* VIELVA. Calidar), a tn. of the dept. of Amer. France, on the Allier, 25 m. N.E. of Clermont. It is a famous watering-place and its springs were known to the Romans. Pop. 15,300.

Vicla, *see* VIELVA.

Vicious Intromission, *see* INTRO-MISSION.

Vickerstown, N. and S., a tn., Walney Island, Lancashire and the home of the employees of Vickers Machine Ordnance factories. Pop. about 4000.

Vicksburg, the co. seat of Warren co., Mississipp., U.S.A. It is an im-

portant cotton manufacturing centre and has also railroad shops and machinery works. Pop. (1910) 20,814.

Vico, Giovanni Battista (1668-1744), an Italian philosopher, historian, and jurist, born at Naples, where he became professor of rhetoric in the university. In 1734 he was appointed historiographer to Charles III., King of Naples. His chief work is *Principi della Scienza Nuova d'Intorno alla Commune Natura delle Nazioni* (1725) of which Michelet published a French translation, *Principes de la Philosophie d'Histoire* (1827). See Flint, Vico, 1885, and R. G. Collingwood's translation, *The Philosophy of Giovanni Battista* (revised by Professor Benedetto Croce), 1913.

Vico Equense, a tn. in the prov. of and 15 m. S.E. of the city of Naples, on the Bay of Naples. Pop. (est.) 11,000.

Victor, a city of Teller co., Colorado, U.S.A., 4 m. S.E. of Cripple Creek by rail, the centre of a mining district. It was settled in 1894 and destroyed by fire in 1899. Pop. (1910) 3162.

Victor, Claude Perrin, Duke of Belluno (1764-1841), a French marshal, born at La Marche (Vosges). He entered the army in 1782, distinguished himself at Toulon (1793), and became a brigadier-general. He commanded in the Italian campaigns of 1796-97 and 1799-80, and won distinction at Marengo. He was captured by the Prussians (1807) and exchanged for Blücher. At Friedland he won the baton of a marshal, and in 1808 was created Duc de Belluno. He took part in the campaigns in Russia, Germany, and France. He went over to the Bourbons, and was on the commission appointed to try those officers who deserted to Napoleon during the 'Hundred Days.' He was Minister of War (1821-23) and served in Spain (1823).

Victor, Sextus Aurelius (*fl.* 370 A.D.), a Roman historian, was city prefect under Theodosius and possibly consul with Valentinian in 370 A.D. His life and his claim to the authorship of the following treatises are alike obscure. These are *Origo Gentis Romanæ*, *De Viris Illustribus Urbis Romæ*; *De Cæsaribus*; and *De Vita et Moribus Imperatorum Romanorum*, which were first published together in 1579.

Victor Amadeus, see SAVOY.

Victor Emmanuel I. (1759-1824), King of Sardinia (1802-21), born at Turin. He commanded the Sardinian forces against the French (1792-96), who occupied all the continental possessions of his family. The first peace of Paris (1814) restored to him Piedmont, Savoy, and Nice, and the second (1815) restored Genoa. He

abdicated in favour of his brother, Charles Albert, in 1821.

Victor Emmanuel II. (1820-78), King of Sardinia (1849-61) and of Italy (1861-78). He ascended the throne on his father's abdication after the defeat at Novara (March 23, 1849). Alded by his ministers, D'Azeglio and Cavour, and later by Garibaldi, Victor Emmanuel II. had created a new Italian kingdom by the end of 1860, and was proclaimed King of Italy (Feb. 26, 1861). In 1866 he wrested Venetia from Austria, and in 1870 occupied Rome. See ITALY. See also Lives by Godkin (1879) and Dicey.

Victor Emmanuel III. (b. 1869), King of Italy, the only son of King Humbert I. He ascended the throne on the assassination of his father (July 29, 1900). He entered the army (1887); became lieutenant-general (1894) and commanding general at Naples (1897). He represented his father at the Russian court (1896), at the Victorian Jubilee (1897), and at Berlin (1900). In 1896 he married Princess Elena of Montenegro. As a result of the war with Turkey (1911-12) he added Tripoli to the Italian domains.

Victoria: 1. The cap. of British Columbia, has a fine situation, with a harbour only admitting vessels of 18 ft. draught, on the S.E. margin of Vancouver Is. It is a well-built, pleasant city with a cathedral, a high school affiliated to McGill University in Montreal, a public library, a handsome park on Beacon Hill, and electric lighting and tramways. Esquimalt, the headquarters of the British Pacific squadron is 3 m. to the W. In 1910 the factory products were estimated at \$4,244,034, a rapid increase in the decade from 1900. Pop. (1911) 31,660. 2. A tn. on a goldfield, 13 m. S.S.W. of Gutu, in Southern Rhodesia. 3. A seaport shipping coffee, rice, sugar, and manioc, 290 m. N.E. of Rio de Janeiro, in Espirito Santo, Brazil. Pop. about 11,500. 4. A tn. with a commerce in cereals and sugar, 40 m. W.S.W. of Caracas in Venezuela. Pop. about 8500. 5. A vil., 118 m. S.E. of Concepcion by rail in the prov. of Malleco, Chile. Pop. 8000. 6. The chief city and port, manufacturing cotton, sugar, and vermilion in the British island of Hong Kong. Pop. (Chinese in 1911) 219,386. 7. The cap. of Labuan Is., a British possession off the S.W. of British N. Borneo, Malay Archipelago. Pop. about 2000.

Victoria, a British iron-clad, was launched in 1887. Whilst engaged in manoeuvres off Tripoli on the coast of Syria, she was rammed by the *Camperdown*, and sank in a few

minutes with the admiral, Sir George Tryon, and 358 of her crew (June 22, 1893).

Victoria (1819-1901), Queen of Great Britain and Ireland, Empress of India. Daughter of the Duke of Kent, a son of George III., she succeeded her uncle William IV. in 1837. Her succession to the throne separated the thrones of Hanover and Great Britain which had been held by British sovereigns since the accession of George I. Her reign opened somewhat inauspiciously. Canada was in revolt, but by 1839 Canada was united and granted a constitution. But at home more troubles prevailed. The Chartists were at the height of their power and small riots were breaking out in many parts of the country. Melbourne, her first Prime Minister, was compelled to resign in 1839, but the bed-chamber question prevented the constitutional succession of Sir Robert Peel. In 1841 Peel, however, became Prime Minister, and many important measures were passed. In the meantime (1840) the queen had married her cousin, Prince Albert of Saxe-Coburg. The ministry of Peel (1841-46) witnessed many stirring episodes and events. War broke out in Afghanistan and with the Sikhs, the latter war ultimately resulting in the annexation of the Punjab in 1849. The Tractarian movement, which had made a great stir in religious circles, culminated in 1845 in the secession of Newman to Rome. In the same year the importance of some revision of the Corn Laws became obvious. Peel, the head of the Protectionist party, had his hand practically forced by the potato famine in Ireland, and in 1846, after having resigned and been compelled to resume office, repealed the Corn Laws, and in so doing smashed the Tory party, who went into the wilderness to be educated by the future leader, Disraeli. The next ten to fifteen years were occupied chiefly with foreign affairs, which were directed chiefly by Palmerston. His policy and his independence did not appeal either to the queen or to the Prince Consort. The royal policy was reflected in the exhibition which was held in 1851, the Palmerstonian policy in the glee with which he hailed the revolutions of 1848. In 1851 Palmerston was forced to resign, since he had sent despatches congratulating Louis Philippe on the *coup d'état* without having the sanction of his sovereign. In 1854 the Crimean War broke out, and in 1855 Palmerston was to office and concluded the war following year. Still, relative to the queen were not of the best, and their policy may be called Imperial-

the direction of the Indian Mutiny by the government did not always fall in with the wishes of the queen. The Conspiracy Bill, a palpable attempt to conciliate Louis Philippe, led to the downfall of Palmerston, but even yet the Tory party were not strong enough to hold the reins of government. In 1859 Palmerston was again in power in spite of Lord Derby's attempt to hold the Conservatives in office. In 1861 the Civil War in America broke out, and caused a great famine in Lancashire. Public sympathy was, on the whole, on the side of the South, and the escape of the *Alabama* was received with general rejoicings, although later it cost this country a very considerable sum (£3,250,000). The next decade witnessed a great change in the political life of the country. To a very great extent the deaths of the Prince Consort (1861) and of Lord Palmerston (1865) mark a distinct division in the reign of the queen. The accession to power of Disraeli in 1868, and of Gladstone in the same year, changed the politics of England. Between 1832-68, the Whigs had been almost continually in power, relying for support upon the middle classes who had been enfranchised by the Reform Act of 1832. The accession to power of Disraeli marks the beginning of Conservative power, i.e., a Tory party who realised the conservative tendencies of the lower middle classes, sought to enfranchise them, and were prepared to move with the times; the accession to power of Gladstone marks the beginning of a Liberal party who were more progressive and, for want of a better word, more radical than their Whig forebears. Disraeli succeeded to power in 1868, but the time of the Conservatives had not yet come; he was defeated on the question of the disestablishment of the Church in Ireland, and Gladstone succeeded. He was in power between the years 1868-74. During that period many sweeping measures were introduced and passed; the Irish Church was disestablished, an Irish Land Act, an Elementary Education Act, a Ballot Act, and a Judicature Act were passed, and purchase was abolished in the army. All these measures, although good, were startling, and in the sight of many old Tories almost revolutionary. The queen did not view them all with pleasure, and, indeed, was held to object to some of them. In 1874, however, the dissolution was succeeded by a Conservative government and Disraeli became for a really a Prime Minister. The keynote of Dis-

ism, called by his political opponents 'jingoism.' In 1875 he bought up the greater number of the Suez Canal shares, which proved of overwhelming importance in the pursuance of our Egyptian policy at a later date. In 1876 the queen adopted the title of Empress of India, India having become a crown colony after the suppression of the Mutiny. The policy of Disraeli (or Beaconsfield as he then was, having accepted an earldom in 1876) in the Near East was bitterly attacked by Gladstone, but the Congress of Berlin, followed by the Treaty of Berlin in 1878, was supported by the greater part of the inhabitants of Great Britain. In 1879 the Zulu War was brought to a successful close, and in the same year the celebrated Midlothian campaign brought to an end the Conservative government. The Liberals were returned to power with a large majority, and Gladstone became premier for the second time. In 1881 the Boer War and the defeat of Colley at Majuba was followed by the granting of independence to the Boers. British supremacy in Egypt was established by the battle of Tel-el-Kebir (1882), but the attempt to evacuate the Sudan was not so fortunate, and Gordon was killed at Khartoum before the relieving party could reach him. The affair created much feeling in the country at the time, but there seems little doubt now but that Gordon reversed the policy of evacuation when he landed in Egypt. Ireland had been a source of constant trouble, and the Irish Land League was persistent in its demands for Home Rule. The disorder culminated in the Phoenix Park murders in 1882. This was followed by a Crimes Act which for a time restored order. In 1885 Salisbury formed a ministry which, however, only lasted six months, at the end of which Gladstone again returned to power. He had determined that the policy of coercion must cease in Ireland, and introduced a Home Rule Bill which split the Liberal party, who were defeated. Salisbury's second administration was formed in July 1886, and lasted until 1892. In 1887 the queen celebrated her Jubilee. Attempts were made to promote order in Ireland, free education was established, and county councils set up. During this administration the Liberal dissentients from Home Rule, called Liberal Unionists, generally supported the Conservatives. In 1892 Gladstone became premier for the fourth time, and introduced a second Home Rule Bill. This was defeated in the Lords, and Gladstone retired from leadership and politics. He was

succeeded by Rosebery, who was defeated in 1895 on the 'cordite vote,' and the Conservatives and Unionists as a coalition returned to power. Salisbury became premier for the third time. This ministry witnessed the Jameson raid (1896), the advance into the Sudan and the quarrel with the French in the matter of Fashoda which nearly led to war. In 1899 the trouble with the Boers in South Africa, which had been acute since 1896, resulted in the outbreak of the South African War. In 1900 the Australian Commonwealth Bill was passed, and the Boxer massacres led to international intervention in China. In the January of the next year Queen Victoria died. She had celebrated her Diamond Jubilee in 1897, and had reigned for a longer period than any previous sovereign. She had shown herself, on the whole, a constitutional monarch, but one with a keen insight into her own prerogative. Throughout the empire she was known and loved, and in the latter years of her reign was a most popular sovereign. See *Biographical Dictionary*; Lee, *Life of Queen Victoria*, 1904.

Victoria, Eugenie Julia Ena (b. 1887), the only daughter of the late Prince Henry Maurice of Battenberg and the Princess Beatrice. In 1906 she married King Alphonso XIII. of Spain, and has two sons and two daughters, the Prince of the Asturias being born in 1907.

Victoria, Lake, or Zor-kul, or Sarykul, lies at an altitude of 13,400 ft. on the Great Pamir, in Ferghana, Russian Turkestan, Central Asia. It is a vestige, gradually diminishing in size, of a prehistoric period of glaciation, and is probably not the true source of the Oxus.

Victoria Cave, situated 1½ m. N.E. of Settle in Yorkshire, 900 ft. above the Ribble, and 1450 ft. above the sea. Romano-Celtic antiquities, including coins, pottery, and bronze ornaments and implements, were discovered in the uppermost layer, and in a lower the bones of the elephant, hyæna, rhinoceros, and bear. It was first explored in 1837.

Victoria Cross, a special decoration which can be conferred on officers or men of the army or navy for some special deed of bravery. It was founded by Queen Victoria towards the conclusion of the Crimean War (1856). It consists of a Maltese cross made of bronze, bearing in the centre the royal crown surmounted by a lion, and with the scroll superscribed 'For Valour.' The winning of the V. C. carries with it a pension of £10 per annum, which can, under special circumstances, be made up to £50.

Consult *The F.C.: its Heroes and their Valour*, by D. H. Parry, 1913.

Victoria Day, see EMPIRE DAY.

Victoria Falls, The (native name *Mosioutunya*, 'smoke sounds there'), great waterfalls upon the R. Zambesi, in Rhodesia, Central Africa, 900 m. from the sea; discovered

Dr. Livingstone in 1855. Above the falls the river is flat and broad, dotted with thickly wooded islands. At this point it is some 1860 yds. wide, and then drops over a chasm extending the whole breadth and varying from 250 to nearly 400 ft. Its course is impeded by an opposite wall, nearly as high, the water escaping through a channel of 100 ft. width, through the 'Boiling Pot,' into the Grand Cañon, now spanned by a splendid bridge. Great clouds of mist rise from the seething waters, which are visible for 20 m. The railway to Bulawayo was opened up in 1905, and the falls are also connected by rail with Capetown (1642 m.).

Victoria Land was so named after Queen Victoria, and was discovered in 1841 by Captain James Clark Ross. It is a region of the Antarctic lying between 180° and 150° E. long. Ross followed its margin as far as 78° 4' S. lat. Here are situated Mt. Erebus and Mt. Melbourne, which belong to a lofty chain.

Victoria League. This league was established in 1901 shortly after the celebration of Queen Victoria's Diamond Jubilee. Its objects are to promote an intimate understanding and general rapprochement between the people of the United Kingdom and those of the colonies and dependencies, to provide literature for settlers in the more outlying colonies, and to act as a centre for the receipt and distribution of information regarding the British Empire. The headquarters office is at

2 Wood Street, London, W. It is managed by a council and executive committee, has a membership of over 10,000, and had an income (1910) of over £2000.

Victoria Mount, the culminating point (13,121 ft. high) in the Owen Stanley Range of New Guinea, which rises in the S.E.

Victorian Order, The Royal, see ORDERS OF KNIGHTHOOD.

Victoria Nyanza, the largest lake of Africa, having an area of over 26,000 sq. m. As a fresh-water lake it is in size second to Lake Superior alone. The Victoria Nyanza is situated on the equator and bounded by British Uganda and German E. Africa, and forms the chief reservoir of the Nile. On the N.E. lies Kavirondo Bay, and on the S.E. is the large Speke Gulf, and the narrow inlet of Smith Sound

to the S. The chief inlets on the W. are Berkeley Bay, Macdonald Bay, and Napoleon Gulf. The coast is broken up by numerous islands, the chief being Bukasi, Sesse, Ukerewe, and others. The Nile flows the Kagera, the Nile, and the only outlet is the Nile. The southern region of the lake was discovered by Speke in 1858 and the northern part in 1861. Stanley sailed round it in 1875 and 1879, and Baumann in 1892. Commander Whitehouse completed his survey of the coast and islands in 1906.

Victoria Regia, Queen Victoria, or Royal Water Lily, a magnificent aquatic plant (order Nymphaeaceae), native of S. American rivers. It has a thick, fleshy root stock, and huge tray-like leaves from 6-12 ft. in diameter, green above and purple or violet beneath. The flowers are very large and fragrant. It is grown in tanks in stovehouses.

Victoria University, The, Manchester, was founded in 1880. It was formed from the union of Owens College, University College, Liverpool, and Yorkshire College, Leeds. This constitution continued until 1903, when the Leeds College was formed into a separate university. In the next year Leeds also established its own university. V. U. has a regular course of study for its degrees, and thus

The town is built on a hill of 4100 ft. Pop. 3000.

Victory, The, 2164 tons.

Victory, The, 1765, in-chit flagshl altar and of Nelson and Trafalgar (1805). A former Victory was flagship of Sir John Hawkyns at the defeat of the Spanish Armada (1588).

Victualling, see RATIONS.

Victualling Bill, an authorisation issued by the customs house permitting the embarkation by the captain of an outward-bound vessel of such bonded stores as are needed for the voyage.

Victualling Yards. There are three large naval V. Y. in England: the Royal Victoria at Deptford, the Royal Clarence at Gosport, and the Royal William at Plymouth. There are also the Royal Alexander at Portsmouth, and yards at Wel-hal-Wei.

Vicuña, or **Vicugna** (*Luchenia vicuña*), a small ruminant, native of Bolivia and N. Chile. Its soft silky fur or wool is brown in colour, and much valued for the manuf. of choice fabrics. The V. is very wild, active, and sure-footed, and is much hunted.

Vida, **Marco Girolamo** (1490-1566), a Latin poet, born at Cremona. He became a canon of St. John Lateran at Rome; was appointed Prior of St. Silvester, Tivoli, by Pope Leo X., and Bishop of Alba by Clement VII. (1532). His chief poems are: *Christias*, 1535; *De Arte Poetica*, and *Scacchia Ludus*. See *Life* by Lancetti, 1840.

Vidal, **Peire** (fl. 12th century), a Provençal troubadour, born at Toulouse. He became a favourite at the courts of Alfonso II. of Aragon, Alfonso VIII. of Castile, and Barral, Viscount of Marseilles. He probably went on a crusade with Boniface de Montferrat. His *Songs* were published by Bartsch (1857). See *Life* by Schöpf, 1887.

Vidocq, **Eugène François** (1775-1857), a French criminal and detective, born at Arras. He engaged in a series of discreditable escapades, was for a time an acrobat, and served in the army. In 1796 he was convicted of forgery in Paris and sentenced to eight years in the galleys. He escaped and in 1809 entered the secret police of Paris, and in 1812 was made chief of the 'Brigade de Sûreté.' In 1832 his private detective office was suppressed. His *Mémoires* (1829) are of doubtful authenticity.

Vieira, **Antonio** (1608-97), a Portuguese missionary, born in Lisbon. He was educated by the Jesuits at Bahia, Brazil, and entered the order in 1625. In 1652 he became director of the Northern missions in Brazil. He was condemned and imprisoned by the Inquisition (1665). In 1681 he was made director of the Jesuit convents in Brazil.

Vien, **Joseph Marie** (1716-1809), a French painter. He lived chiefly at Paris, and became a member of the French Academy in 1754, while subsequently Napoleon made him a count and a senator, and decorated him with the Cross of Commander in the Legion of Honour. The Louvre has one of his mythological pictures, while other works of his are at Montpellier, Versailles, and Orleans.

Vienna, the metropolis of the Austrian empire, situated on the right or S. bank of an arm of the Danube, into which the little R. Wien discharges itself on the E. side of the old city. V. consists of the interior or old city, and the suburbs. The old city is nearly circular, and not above 3 m. in circumference. It is surrounded by a broad fosse, and a wall from

40 to 50 ft. high, which has ten regular bastions, and forms altogether what is called the Bastei, now one of the most favourite promenades of V., commanding a very fine view. The inner or old city is very irregularly built; most of the streets are crooked and narrow. The old city is the most fashionable: it contains the palaces of the emperor, of many of the principal nobility, the public offices, the finest churches, and most of the museums and public collections, the colleges, the exchange, and the most splendid shops. The public buildings, palaces, churches, etc., are very numerous. The cathedral, dedicated to St. Stephen, is a beautiful Gothic structure. The Burg, or imperial palace, is an old irregular edifice built at different times; it contains the imperial jewel office. The Imperial Library connected with the Burg is a handsome edifice, containing above 300,000 volumes and 16,000 manuscripts. The principal establishment for education is the university, founded by Duke Rudolph IV. in 1365. It is attended by above 2000 students, and has 80 professors; has a library of 100,000 volumes, an observatory, a botanic garden, a veterinary school, and other appendages. The Josephinum, founded by Joseph II., is a medical institution for the instruction of surgeons for the army. V. being the centre of the Austrian dominions, is likewise the principal seat of commerce and manufactures. The principal manufactures are silk, velvet, shawls, gold and silver lace, cottons, woollen, ribbons, carpets, leather, porcelain, jewellery, mathematical and musical instruments, firearms, gold and silver plate, watches, fine cutlery, carriages, gloves, lace, straw hats, paper, etc. The public promenades, which are the great places of resort for the citizens of V., are the Bastei, or ramparts of the old town; the Glacis, or esplanade between the city and the suburbs; the Volksgarten (the people's garden); the private gardens of the palaces of Liechtenstein, Rasumowsky, Schwarzenberg, and the Belvedere; and the Prater, in the suburb Leopoldstadt, which is an immense park. Great lines of railway extend from V., N.N.E. to Warsaw; N.W. through Prague, Dresden, and Berlin to Hamburg; E. through Pesth to Debreczin; and S.S.W. (nearly completed) to Trieste. Pop. 2,031,498.

Vienne: 1. A dept. of W. Central France, formed in 1790 out of about four-fifths of Poitou, and of Touraine and Berry. It is situated between Indre on the E. and Deux-Sèvres on the W., and is divided into the five

instance of Justinian, Emperor of the East, who had just deposed Sylverius on a charge of having corresponded with the Goths. He took a considerable part in the theological controversy known as the 'Three Chapters,' which 'chapters' he refused to condemn until after the Council of Constantinople.

Vigna, Pier della, or Petrus de Vineia (c. 1190-1249), an Italian statesman and jurist, born at Capua. The emperor, Frederick II., appointed him his chancellor, and V. defended him before the Council of Lyons in 1245. He was also legate to the papal and English courts. He was later accused of conspiring against the emperor's life, and condemned to be blinded and imprisoned. His publications include *Letters*, valuable as a record of the history of the time; Latin and Italian poems, and *De Potestate Imperiali*. See *Life* by Huillard-Bréholle, 1864.

Vignette, the name given to a small engraving or design which has not a definite border. It was originally only employed as a term in architecture to designate an ornament of vine leaves and grapes.

Vignola (Giacomo Barozzi, or Barocchi) (1507-73), a celebrated Italian architect, born at Vignola, near Modena. Succeeded Michelangelo as the architect of St. Peter's, Rome, and designed the Escorial in Spain, and the palace of Cardinal Alexander Farnese at Caparola, near Viterbo. A good deal of his life was spent in France, where he executed several fine bronzes. He wrote treatises on architecture and perspective.

Vigny, Alfred Victor, Comte de (1799-1863), a French poet, born at Loches (Indre-et-Loire). He came of a soldier family, and served in the army for twelve years. He published his first volume of poems in 1822, and four years later his famous prose romance *Cinq-Mars*, followed by *Poèmes Antiques et Modernes*. In 1832 appeared his drama of *Chatterton*, and amongst his other dramatic work may be mentioned: *Quitté pour la Peur* and *Shylock*, an adaptation of *The Merchant of Venice*. He left a volume of verse, entitled *Les Destinées* (1864), containing some fine poems, and *Journal d'un Poète* (1867). V.'s reputation rests on his poems, and he possessed poetical qualities of a rare nature. See *Lives* by Paléologue (1891), Assé (1895), and Lauvière (1910).

Vigo, a seaport and fort. tn. of Spain, on the Rio de Vigo. It has a deep and spacious harbour, and important sardine and other fisheries, and is a port of call of several steam-

ship lines. Shipbuilding is also carried on, and there are tanneries, soap works, distilleries, flour and paper mills, and sugar refineries. The town was attacked by Drake towards the end of the 16th century, and in 1702 the allied Anglo-Dutch fleet sank the French and Spanish ships and the Spanish treasure fleet from America. Pop. 26,000.

Vigors, Nicholas Aylward (1787-1840), an Irish zoologist, born at Old Leighlin, co. Carlow. Having purchased an ensigncy in the Grenadier Guards (1809), he served in the Peninsular War, being wounded in 1811, when he left the army and devoted himself to the study of birds and insects. He took an active part in forming the Zoological Society, and was its first secretary, and to this society he presented his collections. He published various papers on birds (1825-39).

Vihara, see ARCHITECTURE—India.

Vijayanagar, see BIJAYANAGAR.

Vikings, another name for Norsemen (q.v.).

Vikramorvasi, see KALIDASA.

Vilayet, an administrative div. or prov. of the Turkish empire.

Vilhelmina, a tn. in the län of Vesterbotten, Sweden, about 115 m. W.N.W. of Umeå. Pop. 7368.

Vilkomir (Polish *Wilkomierz*), a tn. of Russia in the gov. of Kovno, 40 m. N.E. of Kovno. It has trade in flax. Pop. 16,000.

Villach, a tn. of Austria on the Drave, in the prov. of Carinthia, with manufs. of lead, cement, colours, and chemicals. There are hot sulphur baths in the vicinity, and about 9 m. to the W. are the lead mines of Bleiberg. Here, in 1492, the Germans gained a victory over the Turks. Pop. 19,265.

Villafranca: 1. A tn. in the prov. of Verona, Italy, 10 m. from Verona tn. The peace preliminaries were signed here in 1859 by Napoleon III. and the Emperor Francis Joseph after the battle of Solferino. Pop. about 5300. 2. A tn. in Piedmont on the Po; famous for its silk industries. Pop. about 10,000. 3. A fort. tn. and trading port of France in the dept. Alpes-Maritimes, on the Gulf of Nice. It is the station for the French Mediterranean fleet in the winter, and has marble quarries. Pop. (com.) 5000.

Villa Franca do Campo, a seaport of the Azores in São Miguel Is., on the S. coast, with sulphur springs. Pop. 7500.

Villagarcia, a tn. in the prov. of Pontevedra, Spain, situated in the dist. of Cambados. Pop. 8000.

Village Community, consisted of a number of families standing in a proprietary relation to a district divided into three parts. These three por-

tions were: the mark of the township or village, the common mark or waste, and the arable mark or cultivated area. The community inhabited the village, held the common mark in mixed ownership, and cultivated the arable mark in lots appropriated to the several families. Each family was governed by its own head, who made law within his house and enforced it without, but he stood in a number of intricate relations to the other heads of families, so that the rights of one family over the common mark were controlled by the rights of every other family. Thus, when a householder felled wood or grazed cattle in the common forest an officer watched to see that the common domain was equally enjoyed. Again, in the arable

and his own
three fields

Teutonic
invariably
rotation of

crops), but he could not cultivate as he liked. He had to sow the same crop as the rest of the community and allow his lot in the uncultivated field to lie fallow with the others; i.e., he must do nothing to interfere with the right of the other households. See *Malne, Village Communities in the East and West*.

Villa Mercedes, a tn. in the prov. of San Luis, Argentine Republic, 58 m. S.E. of San Luis. Pop. 5500.

Villani, Giovanni (c. 1275-1348), an Italian chronicler, born at Florence. He spent some time in travel, being engaged in commerce, and visited France and Flanders, following all the movements of the war between Philip the Fair and the Flemings. His great work, *Historie Florantiae* or *Cronica Universale*, was suggested by a visit to Rome at the jubilee of 1300.

This begins with comes down to chronicle extends Europe. It is early mediæval besides being very important for Italian history in the 14th century. It was continued by Matteo V., his brother, and Matteo's son, Filippo V., who take the chronicle down to 1364.

Villa Nova de Gaia, see GAIÁ, VILLA NOVA DE.

Villanueva: 1. A tn. of Spain in the prov. of Andalusia, 28 m. from Málaga. Pop. 5000. 2. A com. of Spain in Galicia, 12 m. from Pontevedra. Pop. 7000.

Villanueva de la Serena, a thriving tn. of W. Spain in the prov. of Badajoz, noted for its wine and fruit, especially melons. Pop. 13,500.

Villanueva-y-Geltru, a seaport tn. on the E. coast of Spain in the prov.

of Barcelona, with manufactures of cotton, paper, lace, and soap. Pop. 12,000.

Villa Real, a tn. of Portugal, 45 m. from Oporto. It is the capital of the prov. of Villa Real, and has trade in live stock, wine, and mineral waters. Pop. 6800.

Villareal, a tn. in the prov. of Castellón, Spain, 4 m. S. of Castellón de la Plana. Pop. 16,600.

Villa Real de Santo Antonio, a tn. and port of Portugal in the dist. of Faro, near the famous copper mines of São Domingo. Pop. 5200.

Villa Rica, a tn. in Paraguay, 75 m. E.S.E. of Asunción. It is chiefly noted for the manufacture of tobacco. Pop. 25,000.

Villa Rosa, a tn. in Sicily, 11 m. N.E. of Caltanissetta. Pop. (com.) 12,300.

Villars, Claude Louis Hector, Duc de (1653-1734), a marshal of France, born at Moulins. He served in the Dutch wars and also helped the Elector of Bavaria against the Turks, and in 1702 defeated the Margrave of Baden at Friedlingen. For this victory he was made a marshal, and in 1709 was sent to command the main army opposing Eugene and Marlborough on the N. frontier, but was wounded at Malplaquet. He was at the head of the last army France could raise, and saved his country by his victory at Denain (1712), when he fell upon the British and Dutch under Albemarle and drove Prince Eugene under the walls of Brussels, negotiating the Peace of Rastatt (1714). He played a conspicuous part in the politics of the regency period as the principal opponent of Cardinal Dubois, and took the field for the last time in the War of the Polish Succession (1734). He was one of the greatest

French history.

a genus of aquatic or
nts (order Gentianaceae).

V. has cordate floating
large yellow-fringed flow-

ers. It is the only British species.

Villa San Giovanni, a tn. of Italy, situated on the Strait of Messina, 7½ m. N. of Reggio. Pop. 3000.

Villasis, a tn. in the prov. of Pangasinan, Luzon Is., Philippines, on the Agno, 24 m. S.E. of Langayan. Pop. 12,600.

Villefranche, a tn. of France in the Rhône dept., on the Saône, noted for its cloth (Beaujolais), wine, and cattle. Pop. 16,000.

Villefranche-de-Rouergne, a tn. of France in the dept. of Aveyron, on the R. Aveyron. There are manufactures of hemp, and phosphate quarries, sulphur springs, and tin and argentiferous lead mines are in the vicinity. The church of Notre Dame, with its

massive tower, dates from the 13th century. Pop. (com.) 8300.

Villegas, Esteban Manuel de (1596-1669), a Spanish lyric poet, born in Castile. He practised for some time as a lawyer at Nájera, but in 1659 he was accused of expressing unorthodox views on the subject of free-will, and exiled. He published *Las Eroticas* (1617), a collection of éléver translations from Horace and Anacreon, and of original poems, as well as a version of Boethius, 1665.

Villehardouin, Geoffroi de (c. 1160-c. 1213), the first French historian, born in Aube. He took part in the Fourth Crusade, was several times employed in negotiations, witnessed the capture of Constantinople in 1204, and was appointed by the Emperor Baldwin marshal of Romania. He afterwards served the Emperor Henry, commanding under him in a naval battle at the fortress of Cihotus, and received the fief of Mesinopolis. His *Histoire de la Prise de Constantinople par les Français et les Vénitiens* is a valuable record of the events of the crusade from 1198-1207. The first printed edition appeared in 1585; subsequent editions are by De Wailly (1874) and Bouchet (1891).

Villein, in feudal law, one who held lands by base or servile tenure. Vs. are generally believed to have been either (1) *regardant* or *adscriptitie glebae*, i.e. attached to the soil; or (2) *in gross*, i.e. annexed to the person of their lord, but Vinogradoff would seem to have disposed of this legal fiction. The system of villeinage gradually died out after Wat Tyler's rebellion in 1381. See Vinogradoff's *Villeinage in England*.

Villemain, Abel François (1790-1867), a distinguished French politician and writer, born at Paris. During the years 1812-16, three of his literary essays were crowned by the French Academy. In 1816 he was appointed to a chair of modern history at the Sorbonne, as assistant to Guizot. In 1827 he, along with Lacretelle and Chateaubriand, drew up the petition addressed by the French Academy to Charles X. against the re-establishment of the censorship of the press. V. held the portfolio of public instruction in the ministries of Soult (1839-40) and Guizot (1840-44). His principal works are: *Cours de Littérature Française, Tableau du XVIII^e Siècle*, and *Souvenirs Contemporains*.

Villemarqué, see LA VILLEMARQUÉ, THÉODORE CLAUDE HENRI HERSART, VICOMTE DE.

Villemomble, a tn. in the dept. of Seine, France, having gypsum quarries. Pop. about 5000.

Villena, a tn. in the prov. of Ali-

cante, Spain, about 30 m. N.W. of Alicante. The chief product is salt. Pop. about 14,000.

Villena, Enrique de (1384-1434), a Spanish writer, showed great capacity for learning and was reputed to be a wizard. He was appointed master of the military order of Calatrava in 1404, but after 1417 retired and devoted himself to literature. He published *Arte de Trocar*; *Los Trabajos de Hércules*, a pedantic allegory; *Tratado de la Consolacion*; *Arte Cisoria*, a handbook to the pleasures and fashions of the table; *Libro de Ojamiento*, a dissertation on the evil eye and its effects; and a translation of the *Æneid*, the first ever made.

Villeneuve, Pierre Charles Jean-Baptiste Silvestre (1763-1806), a famous French admiral. At the age of fifteen he entered the navy, was rapidly promoted, and in 1796 attained the rank of rear-admiral. In the battle of the Nile he commanded the rear of the fleet and escaped with two ships and two frigates to Malta. In 1804 he was created a vice-admiral, and in the next year he, with Admiral Gravina with several ships, sailed for the W. Indies, where they captured some British merchant vessels. In coming back Sir R. Calder intercepted them, but during the night they took refuge in Ferrol, whence they sailed to Cadiz. Here Nelson, after some weeks, caused V. to come out with his fleet (Oct. 19), and on the 21st the British fleet entrapped him off Cape Trafalgar (see TRAFALGAR, BATTLE OF). In 1806 V. was liberated and returned to France; he reached Rennes, where after a few days he was found dead in his room.

Villeneuve-St.-Georges, a tn. in the dept. of Seine-et-Oise, France, situated on the Seine. Pop. 9600.

Villeneuve-sur-Lot, a tn. of France, in the dept. of Lot-et-Garonne. It is an important agricultural centre and has trade in plums, cattle, horses, wine, and market garden produce. Pop. 13,500.

Villeroi, François de Neuville, Duc de (1644-1730), a French soldier, the son of Marquis de V., marshal of France. He was brought up with Louis XIV., with whom he was a favourite, and in 1693 rose to be marshal of France. But he showed great incapacity in the Netherlands, 1695-96, and in 1701 was defeated and taken prisoner by Prince Eugene in Italy. He was again defeated by Marlborough at Ramillies, 1706, after which he lived the life of a courtier.

Villers-Cotterêts, a tn. in the dept. of Aisne, France, and the birthplace of the elder Dumas. Pop. (com.) 5300.

Villerupt, a tn. in the dept. of Meurthe-et-Moselle, France, having blast furnaces. Pop. 6600.

Villeurbanne, a tn. in the dept. of Rhone, France, 3 m. E. of Lyons. The chief manufs. are liquers and chemicals. Pop. 34,000.

Villiers, see CLARENDON, GEORGE WILLIAM FREDERICK VILLIERS.

Villiers, see BUCKINGHAM, GEORGE VILLIERS, DUKE OF.

Villiers, Charles Pelham (1802-98), an English statesman, grandson of the first Earl of Clarendon and a contemporary of Gladstone, born in London. He identified himself with Cobden and Bright in the passing of the Ballot Act and in the free trade movement. From 1835-98 he represented Wolverhampton in parliament, and was president of the Poor Law Board (1859-66).

Villiers de l'Isle-Adam, Philippe Auguste Mathias, Comte de (1840-89), a French poet, born in Brittany. He was descended from the last grandmaster of the Knights of Malta, and gained a reputation both as a satirist and a poet. Among his works are: *Azel; Le Nouveau Monde; La Révolte; Le Secret de l'Echafaud; Morgane; Isis; Contes cruels*, a fine volume of short stories; *L'Eve future* an amazing piece of buffoonery satirising the pretensions of science.

Villingen, a tn. in the Black Forest, Baden, Germany, 40 m. N.W. of Constance. It manufs. clocks and pottery. Pop. 10,926.

Villoison, Jean Baptiste Gaspard d'Ansse de (1750-1805), a French classical scholar, born in Corbeil-sur-Seine, and at a very early age acquired a reputation for his knowledge of Greek. In 1773 he published from an MS. at St. Germain the first edition of Apollonius's *Lexicon* on the *Iliad* and *Odyssey*, together with fragments of Philon. Venico (1778) and c. . . . St. Mark library an . . . *Iliad*, containing 'Scholia,' and in 1. . . Constantinople. He . . . Greece and in the wrote numerous great works, the chief of which is *Anecdota Græca*.

Villon, François (1431-c. 1485), a French poet, born of poor parents in Paris. At an early age he became a student in arts, and by 1452 had taken his M.A. degree. Little is known of him until he was sentenced to killing a priest in a street. He saw him again in the following year he was accused of being the ringleader of a gang of burglars, and sentenced, with others, to be hanged. Having appealed, he was banished and went to Roussillon

in Dauphiné, but in 1461 he was again caught at his old game and imprisoned at Meung-sur-Loire. Being released he was promptly involved in a street quarrel and again arrested, tortured, and condemned to be hanged, but the sentence was commuted to banishment, 1463, and from this time V. passes from history. He was the author of *Grand Testament*, *Petit Testament*, and some forty or fifty short pieces, chiefly ballades, notably: *Ballade des Dames du Temps Jadis; La Grosse Margot; Ballade des Peadus; Ballade pour sa Mère; Regrets de la Belle Heaulmière*. The best modern editions of V.'s poems are those of Paul Lacroix, Pierre Januet, Longnon (1892), Moland (1893), and H. de Vere Stacpool (1913). See Pierre Champaign, *François Villon, sa Vie et son Temps*, 1913.

Vilna, a gov. of European Russia, area 16,100 sq. m., consists of an extensive plain broken with low hills. The low land is marshy, and the country is covered with forest. The rivers are mainly tributaries of the Niemen. The soil is sandy, and the chief occupation is agriculture. Rye, barley, wheat, oats, hemp, and flax are grown, and timber and furs exported. Pop. 1,807,000.

Vilna, a tn. of Russia, cap. of the gov. Vilna, on the Vistula R., near the junction of Libau-Den, St. Petersburg-Warsaw, and Libau-Odessa railways. An old town, it contains an imperial palace, the cathedral of St. Stanislaus (1387), the cathedral of St. Nicholas, built 1596-1601, besides a valuable museum of antiquities, and various other buildings of historical interest. It is an important centre for timber and grain, which are exported, and an archiepiscopal see of the Orthodox Greek Church, besides . . . of the Lithuanian

. . . a tn. in Belgium. Has tan. . . 16,000.

Vimeiro, a tn. in . . . renadura, Portugal, the place at which Wellington defeated the French in 1808. Pop. 700.

Vinaroz, a tn. in the prov. of Castellon de la Plana, Spain near the . . . Sen. Pop. 8000.

TRIVINKLE. . . . (d. 1871), a French . . . of Puy-de-Dôme; he . . . self mainly with still-life, and . . . works of that kind are highly esteemed. Some are in the Musée St. Etienne, while there is a fine example at the Glasgow Municipal Museum.

Vincennes: 1. A tn. of France in the dept. of Seine, 2½ m. E. of Paris. Its celebrated castle, which now serves as a fort, arsenal, and barracks, was built by Philip of Valois, John, and Charles V., on the site of a feudal fortress founded in 1164 by Louis VII. The Bois de Vincennes lies between the fortifications of Paris and the right bank of the Marne. V. has manufs. of chemicals, pianos, organs, metal plates, perfumery, and mineral waters. Pop. (com.) 34,000. 2. A city of Indiana, U.S.A., co. seat of Knox co., on the Wabash R. It has a Roman Catholic cathedral (1835) and a university (1896), and is a railway and manufacturing centre, with flour mills, starch factory, iron foundries, and machine shops. Pop. (1910) 14,895.

Vincent, Saint (*d.* 304), a deacon and martyr, who suffered under the persecution of Diocletian. He was a native of Spain, and was educated by Valerius, Bishop of Saragossa, who ordained him deacon. For professing his faith he was taken to Valencia and put to death. His festival is celebrated on Jan. 22.

Vincent, Sir Charles Edward Howard (1849-1908), an English politician, born at Slinfold, Sussex. He was educated at Westminster and Sandhurst, and in 1871 went to Berlin as special correspondent of the *Daily Telegraph*, again representing that paper in 1876 on the outbreak of the Russo-Turkish War. Having made a study of the questions of law and police, he was, in 1878, made director of criminal investigation at Scotland Yard, and while holding this office reorganised the detective department of the London police system and published *A Police Code and Manual of Criminal Law* (1882). In 1885 he was elected member for Sheffield, and became known as an unwavering advocate of protection, founding the United Empire Trade League in 1891. He also helped to form the volunteer contingents for the South African War (1899), and from 1884-1904 was colonel commandant of Queen's Westminster Volunteers. He published: *Elementary Military Geography. Reconnoitring, and Sketching; Russia's Advance Eastward; The Year Book of Facts in Science and the Arts; The Law of Criticism and Libel*. The *Howard Vincent Map of the British Empire* was published in 1887 (19th ed., 1912, under the auspices of the League).

Vincent, William (1739-1815), dean of Westminster, born in London. He was usher at Westminster, 1761; second master, 1771; and head master, 1788-1802. He was dean of Westminster, 1802-15. He published pam-

phlets, sermons, and treatises on ancient geography, and superintended the restoration works in Westminster Abbey.

Vincent de Paul, St. (1576-1660), a French divine and philanthropist, born at Pony, France. He was ordained priest in 1600, but on a journey to Marseilles in 1604 he was taken prisoner by Turkish pirates and carried off to Tunis, where he was sold as a slave. He served three masters, but the last one liberated him in 1607. He returned to Paris in 1609, became curé of Clichy, and then tutor to the children of the Gondi family. He soon devoted himself to the relief of the poor, establishing what he called 'confréries de charité' in various towns in France. In 1625 he founded the Congregation of Mission Priests to train preachers who were to act as assistants to the regular clergy; and in 1632 the Mission of the Sisters of Charity, who devoted themselves especially to the care of the sick. He was canonised in 1739.

Vincent of Beauvais (c. 1190-c. 1264), a Dominican monk, who was regarded as the precursor of the encyclopædists. He compiled a summary of general knowledge under the title of *Speculum Majus*; was reader to Louis IX., and tutor to his children.

Vinci, see LEONARDO DA VINCI.

Vindex, Gaius Julius, was praetor of Gallia Celtica in the reign of the Emperor Nero. He rebelled against the authority of Nero in 68 A.D., being the first of the Roman governors to do so, and offered the throne to Galba. Verginius Rufus, the governor of Upper Germany, went against him, and the two held a conference at Vesontio, after which V. committed suicide.

Vindelicia, a Roman prov., bounded on the N. by the Danube, on the W. by the territory of the Helvetii, on the S. by Rhætia, and on the E. by the R. Enus (Inn). It was conquered by Tiberius in the reign of Augustus.

Vindhya Mountains, a series of mountain ranges in Central India, connecting at the extremities with the Eastern and Western Ghats.

Vine, or *Vitis vinifera*, a climbing plant, a native of Asia, and cultivated from a remote period for its fruit, which, besides being one of the choicest dessert fruits, is made into wine and other alcoholic liquors, while the dried fruits of certain varieties furnish raisins and currants. The V. was formerly much planted against sunny sheltered walls in the S. of England, but its production of fair-sized fruit is irregular. In a

greenhouse its culture is easy; the roots are generally set in a border outside, the stem passing under arches or through holes into the house, where the shoots are trained up the roof. By control of the temperature, and management of ventilation, fruit can be ripened, according to variety, over a large season.

Vinegar, a weak solution of acetic acid containing colouring matter, and is obtained by the acetous fermentation of poor wine, sour beer, or other dilute alcoholic liquids. In the French or Orleans process, a small quantity of wine is placed in large vats covered with perforated lids. The vats are previously soaked inside with hot V., and the ferment (*mycoderma aceti*) soon gets into the wine. Periodical additions of wine are made until the cask is about half full. The V. obtained is then drawn off and the operations repeated. In the German or 'quick' V. process diluted raw spirit (6 to 10 per cent. of alcohol) with beer or malt extract is allowed to trickle through perforated vats containing beech-wood shavings, which are covered with the ferment. V. by the French process contains 6 to 10 per cent. of acetic acid, whereas that from the quick process contains only 4 to 6 per cent. White V. is obtained from inferior wines, while malt V. is prepared from beer.

Vinegar Hill, a mountain in Ireland, 14 m. from Wexford, where, in 1798, the Irish rebels were defeated by General Lake.

Vineland, a bor. in Cumberland co., New Jersey, U.S.A., 34 m. S.S.E. of Philadelphia. Chief manufs. boots, shoes, and clothing. Pop. (1910) 5282.

Viner, Charles (1678-1756), an English jurist, born in Salisbury. He compiled *A General Abridgment of Law and Equity* in 23 vols., devoting half a century to this work. It was based on the work of Henry Rolle, but was of little value before the publication of an *Alphabetical Index* by Robert Kolham in 1758. He also founded the Vinerian common law professorship, scholarships, and fellowships at Oxford.

Vinet, Alexandre Rodolphe (1797-1847), a Swiss divine and author, born at Lausanne. At the age of twenty he was appointed professor of French language and literature at Basel. This position he held till 1837, when he removed to Lausanne, to fill the chair of practical theology in the academy of that city, which chair, however, he resigned in 1840, when he seceded from the national church. V. took a leading part in the formation of the Free Church of Vaud, formed by seceders from the national church in 1845, this secession having

been in a great measure the result of his writings in favour of the separation of church and state.

Vingt-et-Un, see GAMBLING.

Vinh-long, a tn. of Lower Cochinchina, on the R. Mekong, about 65 m. S.W. of Saigon.

Vinje, Aasmund Olafsson (1818-70), a Norwegian poet, was the principal leader of the movement known as the 'maalstraov,' which was an effort to distinguish Norwegian from Danish literature by the adoption of a peasant dialect. V., who was by birth a peasant and a man of remarkable talent, wrote a volume of lyrics, published in 1864, and *Storegut* (1866), a narrative poem in this fictitious language. He also issued it in a newspaper *Dølen*, a weekly review, which, published from 1858-70, quickly made him famous. Another work of his was *A Norseman's Fiefs of Britain and the British*, 1863.

Vinland, a name given by the Norsemen to the part of America discovered by them, because of the abundance of grapes there. Sighted by Blarni Herjulfsson (986), and explored by him.

Supposed Norse inscriptions have been found at Newport and at Fishkill, Massachusetts, but though

is by no means conclusive. In the *Saga of Red Erik* we are told that 'from its products Leif gave the land a name, and called it Vineland,' and that 'their afterboat was filled with grapes.' See A. M. Reeves, *The Finding of Vineland the Good*, 1890, which contains excellent translations of the two Icelandic sagas in which the finding is recorded, and carefully compiled historical information.

Vinnitsa, a tn. in Podolia, Russia, 85 m. E.N.E. of Kamenets. Pop. 30,000.

Viol (It. *viola*), the generic name for the group of stringed instruments of the 15th to the 17th centuries preceding modern types. The V. was made in four sizes, and had from five to seven strings, tuned in thirds and fourths: (i) the treble or discant; (ii) alto, tenor, or viola da braccio; (iii) bass, viola da gamba—corresponding respectively to the modern violin, viola, and violoncello; and (iv) the contra or double bass, still in use.

Viola, a genus of perennial plants (order Violaceae) which includes not only the violet (*V. odorata*) but also the pansy (*V. tricolor*) and the tufted pansies or florists' V.s., which are among the most adaptive of garden plants.

Viola, or Tenor Violin, see VIOLIN.

Violaceæ, a natural order of plants and shrubs of wide distribution. Many of them possess emetic properties.

Violet, the name of a number of British plants, including the sweet V., marsh V., hairy V., dog V., and mountain V. Many of them are interesting for their production of eleistogene flowers, yielding an abundance of seed in autumn; while the more conspicuous familiar spring flowers yield little or no seed.

Violin, a stringed musical instrument played with the bow, and the most important of its class. It consists of a resonant wooden box called the body; the neck, a solid piece of wood to which is attached the finger-board; and the strings, fastened at one end to the lower part of the body, by means of a projecting tail-piece, and at the other to pegs in the head, the scroll-like termination of the neck. The body consists of two thin, arched pieces of wood joined by side-pieces, or ribs, to form a shallow box. The top surface, or belly, is made of a soft wood, pine or fir. The under surface, or back, is generally of maple or sycamore, as are the ribs. The body is so constructed that there are two deep inward curves in its sides, nearly opposite the portion of the strings on which the bow plays. The neck also is of maple, glued and mortised to a block fixed in the upper part of the body. The tail-piece and finger-board are of ebony, this hard wood being specially necessary in the latter case to prevent the finger-board from being worn into hollows by the player's fingers. Sound-holes are cut in the belly in the form of an *f* on either side of the bridge. The bridge itself is of maple, cut in a peculiar shape, which has remained practically unaltered since its introduction by Stradivarius. Under the right foot of the bridge—or rather a little way behind it—is the sound-post, a small rounded bar of soft pine, joining the back and belly of the instrument, and serving the double purpose of supporting the pressure of the strings and communicating the vibrations to the back. Without the sound-post the tone would be very weak and of a poor quality. The bass-bar is a strip of wood glued to the inside of the V., and passing under the left foot of the bridge. The strings are of catgut and are tuned in fifths, the highest, or first string, sounding the E on the fourth space of the treble clef, and the other three the A, D, and G. In order that the fourth string may not be too thick, the requisite weight is obtained by covering a thin gut string with fine silver wire, or copper wire silvered. In all there are about

seventy pieces of wood used in the construction of the V., though the number may vary. Curiously enough, since the time of the early Italian masters there has been scarcely any alteration in the shape of the V., and modern makers are still following the model of Stradivarius, and endeavour unsuccessfully to reproduce his exquisite tone, which is often supposed to be the result of a secret varnish, but which may be more sensibly attributed to the untiring efforts and experiments to which the old Italian makers devoted their lives. The viola, violoncello, and double bass may conveniently be studied beside the V., for not only do they belong to the same family, but they are very similar in construction, and show only minor variations, while the history of all four instruments runs on parallel lines. The viola is slightly larger than the V., and also comparatively thicker. It is tuned in fifths and a fifth below the V. Music for *violin* is called the *ten* ten on the C

tone is somewhat grave and melancholy, and its quality has an attractiveness quite different from the charm of the V. The violoncello is much larger than either V. or viola, and is held between the player's knees. Like the others, it has four gut strings, but in this case the two lower strings are generally silver-covered. The signature is the bass clef, and it is tuned in fifths, an octave below the viola. The double-bass is largest of all, having a deep, rough tone. It differs somewhat from the other stringed instruments chiefly in having sloping shoulders, and in being differently tuned. Formerly double-basses had only three strings tuned in fifths—A, D, G, on the bass stave—but a fourth string is now usually added, sounding the E below the stave, and the strings are tuned in fourths—E, A, D, G. The *mute* is a contrivance for fixing on the bridge of all stringed instruments to deaden the sound. It produces a dull, veiled note, which, when properly used, is very effective. In following the history of the V. it is necessary to note the distinction between *plucked* and

they are, in fact, origin. It is stringed instruments played with a bow were used in Asia at a very early date, the oldest known form being the *ravanastron*, a hollow cylinder of wood, with serpent-skin stretched on one side, and strings fastened to a wooden rod. It was played with a bow of bamboo and horse-hair. To this curious instrument Indian tradition assigns the date 5000 B.C., when it was said to

have been invented by Ravana, King of Ceylon. The assumption that the Welsh *crwth* was the forerunner of the V., because it was latterly played with a bow, appears to be erroneous. The earliest form in which the Asiatic instrument reached Europe was the Persian or Arabian *rebab*, which became the French *rebec*, of which a drawing appears in an MS. of the Abbé Gerbert, early in the 9th century. The next development was the *viol*, which was the immediate precursor of the V. A lute-maker of Brescia, Johann Kerlino, was said to have manufactured Vs. as early as 1449, in which case he was certainly the founder of the Brescian school. But the first maker who is known to have produced the V. as we now have it was Gaspar da Salo, who worked about 1560. His Vs. were large, very arched, and varnished dark brown. After him came the Breseian school—Maggini, Zanetto, Percgrino, Raphael, and others. Early in the 16th century Andreas Amati founded the Cremona school. He made some improvements, but accomplished less than did his sons, Antonio and Jerome. The most famous member of this family was Nicolo, son of Jerome, who taught the still more famous Antonio Stradivarius (1644-1737). The latter set the standard for succeeding generations, and most of the Vs. now made are modelled on his. His instruments are of a singularly beautiful tone, which has hitherto baffled the efforts of the most expert of his imitators to reproduce. Among his pupils the foremost were Carlo Bergonzi and Giuseppe Nerius. In the family of the there were many V. makers, successful being Joseph Antonio Nerius (b. 1683). Of modern names the best known is Vuillaume, of Paris. The latter city has also produced the most famous maker of V. bows—François Tourte (c. 1780). Among the greatest composers of V. music are Tartini, Viotti, Corelli, and Spohr; while of performers some of the most prominent are Paganini (the great), and others.

'cello playing have had and still have their great exponents, while in Dragon (1755-1846) there existed a famous bass.

Violle (1814-74) was a writer, and travelled in many churches, gaining an immense reputation. In 1845 he was at Arles.

gained, in competition, the work of restoring Notre-Dame together with Lassus. By 1853 he was acknowledged to be the greatest contemporary architect. In 1863 he became professor at the Ecole des Beaux Arts. In 1870 he organised the external defences of Paris during the siege. After the war he became a violent Republican and in 1874 was elected to the Paris municipal council. His admission of being a freethinker lost him his positions in connection with church architecture. He wrote many works, distinguished for vigour and polish, including a great *Dictionary of French Architecture* (1854-68), and various essays and books on architectural subjects. See *Life* by Saint-Paul (1881). His letters have been edited by his son (1902).

Violoncello, or 'Cello, see VIOLIN.

Vionville, a vil. of Lorraine, about 12 m. W. of Metz. It is famous for the battle fought there between the French and Germans in 1870, and known also as Mars-la-Tour.

Viotti, Giovanni Battista (1753-1824), the father of modern violin-

artistic toured London, and was opera-director at Paris (1819-22). He left thirty concertos, many sonatas and quartets which are still admired.

Viper (Viperidae), a family of poisonous snakes, most abundant in Africa and S.W. Asia. The common V. or adder (q.v.) (*Vipera berus*) is the only poisonous British snake. Others of the genus are the horned V. and Russell's V. (l.).

rattlesnakes are also family.

5, or *Echium vulgare*, a handsome British plant (order Boraginaceae) with bristly stems and leaves; and spikes of flowers which are at first rose colour, later turning to blue.

Vipsania, a daughter of Pompey and to Tiberius, to whom he bore a son Drusus, but being divorced by him became the wife of Asinius Gallus.

Vipsanius, see AGRIPPA, MARCUS.

VIRAMANGAM, a municipality of Bombay, British India, 37 m. from Pop. about 22,000.

a tn. of Madras, 12 m. from Tinnivelli. 1,000, chiefly Hindus. a Hindu deity, said to be the same as Hippolytus, killed by a snake. He was worshipped in the grove at Arles.

Virchow, Rudolf (1821-1902), born at Schwelbein in Pomerania. In 1839 he went to Berlin, and took his doctor's degree in 1843. With Reinhardt he founded the *Archiv. für path. Anatomie und Physiologie*. He was a member of inquiry in Upper Burg (1848) on account of political views. In 1856 he became professor of pathological anatomy in Berlin. His *Cellular Pathology* was published in 1858; two other volumes, *Die Krankhaften Geschwülste*, between 1863 and 1867; *Vier Reden über Leben und Krankheit* appeared in 1862; *Lehre von den Trichinen* in 1865. He was the first to consider all tissue as formed of colonies of cells, and to show that the study of their life history was the true basis of medicine. He was keenly interested in anthropology, and was president of the German Anthropological Society from 1869. The Royal Society in England awarded him the Copley medal (1892), and he was Croonian lecturer in 1893. In 1898 he delivered the second Huxley memorial lecture. Politically he was very active, and was elected (1862) a member of the Prussian Lower House. He entered the Reichstag (1880), and became leader of the opposition and an opponent of Bismarck.

Viré, a tn. of France in the dept. Calvados, with a castle built by Henry I. of England in the 12th century. There is also the picturesque Tour de l'Horloge (13th century), the church (13th, 14th, and 16th centuries), and the town-hall (17th century) containing a fine collection of porcelain and pictures. V. exports butter, and has manufs. of hosiery, cloth, and woollens. Pop. (1906) 6228.

Virgil, Polydore, *see* VERGIL.

Virgil, Virgilius, or Vergilius Maro, P. (70-19 B.C.), a Roman poet, born on Oct. 15 near Mantua in Cisalpine Gaul. He was educated at Cremona and Mediolanum (Milan), and he took the toga virilis at Cremona in 55. It is said that he subsequently studied at Neapolis (Naples) under Parthenius, a native of Bithynia, from whom he learned Greek. He was also instructed by Syron, an Epicurean, and probably at Rome. V.'s writings prove that he received a learned education, and traces of Epicurean opinions are apparent in them. After completing his education, V. appears to have retired to his paternal farm, and here he may have written some of the small pieces which are attributed to him. In the division of land among the soldiers after the battle of Philippi (42), V.

was deprived of his property; but it was afterwards restored at the command of Octavian. It is supposed that V. wrote the Eclogue which stands first in our editions to commemorate his gratitude to Octavian. V. probably became acquainted with Mæcenas soon after writing his *Eclogues*, in which Mæcenas is not mentioned. His most finished work, the *Georgica*, was undertaken at the suggestion of Mæcenas (*Georg.*, iii. 41); and was completed after the battle of Actium, 31 B.C., while Octavian was in the East. V. appears to have commenced the *Æneid* about this time.



VIRGIL

A passage in the 7th book (606) appears to allude to Augustus receiving back the Parthian standards, which event belongs to 20. When Augustus was returning from Samos, where he had spent the winter of 20, he met V. at Athens. The poet, it is said, had intended to make a tour of Greece, but he accompanied the emperor to Megara, and thence to Italy. His health, which had been long declining, was now completely broken, and he died soon after his arrival at Brundisium on Sept. 22, not having quite completed his fifty-first year. Besides the *Bucolica*, *Georgica*, and *Æneid*, several shorter pieces are attributed to V., which may possibly have been the productions of his youth. Such are the *Culex*, *Ciris*, *Copa*, etc. Of all his works the *Georgica* is both the most finished and the most original. The *Æneid* is the great national epic of the Romans.

It is said to have been left unfinished, and to have been published by Tucca and Varius after V.'s death. The poem consists of twelve books, which contain the story of the wanderings of Aeneas after the fall of Troy, and his final settlement in Latium. The glories of Rome and the fortune of the Julian house, to which Augustus belonged, are skilfully interwoven in the texture of the poem. V. must be considered as by far the first of all the Roman epic poets. Best editions of V.: Conington (in 3 vols.), with Eug. V. Henry's *Enneidea*.

and William Sellar's fine and sympathetic volume of studies (2nd ed. 1883); Comparetti's *Virgil in the Middle Ages* (English ed. 1895).

Virginal, see SPINER.

Virginia, one of the thirteen original states, bounded on the north and on the east by Maryland and Delaware, and on the south by North Carolina. It has an area of 42,627 sq. m., and is divided into: Tidewater V., the low-lying region along the coast; Middle V., a great triangular plain much divided by its many rivers; the Piedmont strip, and the Blue and Mountain Ridges, with the valley region between. Agriculture is largely carried on; the chief crops being Indian corn, wheat, oats, barley, rye, buckwheat, potatoes, hay, cotton, and tobacco. But manufacturing establishments are increasing. Industries: flour and state also of leather and cotton goods, boots and shoes, fertilizers, cars, foundry and machine-shop products, and iron and steel from blast furnaces. Among important minerals are coal, pig-iron, zinc, lead, and gold. The 1500 m. of tidal shore on the Atlantic, Chesapeake Bay, and the entering rivers have important fisheries, especially of oysters. The chief ports are Norfolk and Newport News, on Hampton Roads, formed by the estuary of the James, on which river stand Richmond, the largest city and capital, and other important cities. Pop. (1910) 2,061,612.

Virginiz, which has the last (1910) was 10,473, showing an increase of about 7500 in ten years.

Virginia, the daughter of L. Virginius, a Roman centurion. Her beauty excited the lust of the decemvir Appius Claudius, who instigated one of his clients to claim her as his slave. In order to preserve her innocence her father stabbed V. As a

result both camp and city rose against the decemvirs, and the old form of government was restored. See Macaulay, *Lays of Ancient Rome*.

Virginia, West, one of the United States, separated from Virginia in 1861. It has an area of 24,170 sq. m., and is bounded on the N. by the Potomac and Ohio Rrs., while the Alleghany Mts. form most of the eastern frontier. The climate is agreeable and healthy. Agriculture employs most of the population, the chief crops being Indian corn, wheat, oats, rye, buckwheat, potatoes, hay, and tobacco; but flour milling is also largely carried on, and there are manufs. of lumber and timber, leather, glass, coke, cars, and iron and steel goods. Carboniferous rocks cover most of the state; they yield coal extensively over large areas (W. V. ranked second in quantity of coal in 1911), and petroleum. Clay, stone, lime, sand, gravel, and iron ore are also among the minerals. Pop. (1910) 1,221,119.

Virginia City, a city and co. seat of Storey co., Nevada, U.S.A., settled in 1859 when the famous Comstock Lode was discovered. The mines under the city produce large quantities of gold and silver bullion. Pop. (1910) 2244, the decrease due to the lowering of the price of silver.

Virginia Creeper, a name given to a number of climbing plants, and especially to *Ampelopsis reischii*, a beautifully foliaged, hardy, and

bird, about the size of a quail in habits.

The plumage is brown on the upper parts and yellow beneath. In the United States it is commonly called 'bob-white' from the note of the male bird.

Virginian Stock (*Malcolmia maritima*), a hardy cruciferous plant bearing racemes of white, red, or blue flowers. Its varieties produce a succession of bloom from early spring to late summer.

Virginia University, Charlottesville, Virginia, U.S.A., was founded in 1819 by President Thomas Jefferson, and opened in 1825. It confers the usual degrees by examination after residence. In 1907 the number of students was 776.

Virginia Water, a dist. of Egham, Surrey, 23 m. from London. The lake lies in the S. of Windsor Great Park, and was formed by the Duke of Cumberland, the victor of Culloden.

Virgin Islands, The, are a group of some hundred, belonging to the Leeward Is. in the W. Indies. Their total area is 465 sq. m., and they lie between 61° 10' and 65° 30' W., and 17°

and 18° 50' N. They belong to Denmark, the United States, and England. Sugar, cotton, maize, limes, and coffee are cultivated. Roadtown on Tortola is the chief city (410 inhabitants). Total pop. (1911) 5562.

Virgin Mary, *see* MARY, THE VIRGIN.

Virgo, the sixth sign of the zodiac, ♍, and an ancient constellation, noted for its nebulae, situated in the head and breast, of which the spiral Messier 99 is the chief. The constellation is entered by the sun about Aug. 21. It was usually represented by a woman holding an ear of corn, Spica, and was identified in Egypt, probably from Chaldea, with the goddess Ishtar. It marked the Egyptian harvest time. It is also associated with Astraea, Demeter, and Persephone. Spica is of magnitude 1.2; γ 3.6 is a binary with a period of 180 years, both variable; ϵ (Vindemiatrix) is of magnitude 3.0; η , another spectroscopic binary, has a period of 72 days. There are thirty stars of magnitudes 4.4 to 5.2.

Viriathus, a leader of the Lusitanians against the Romans. When the Carthaginian influence in the Peninsula had finally been overcome by the Romans, the Lusitanians (inhabitants of what is now Portugal) rose under the leadership of V., who was originally a herdsman. For ten years he kept the Romans at bay (151-141 B.C.), but was finally murdered in 140.

Viridian, a pigment composed of hydrated sesquioxide of chromium, produced by decomposing borate of chromium with water. It is a magnificent deep-green colouring agent, not easily acted upon by atmospheric impurities.

Virtues, *see* CARDINAL VIRTUES.

Virués, Christoval de (c. 1550-1619), a Spanish dramatist and epic poet, a native of Valencia, served for many years in the Spanish army. His famous tragedies, 'Cassandra,' 'Marcela,' 'Elisa Dido,' 'Semiramis,' and 'Attila Furiosa,' were published (1609) under the title *Six Bras Tragicas y Liricas*.

Virus, in medicine, the poison of an infectious disease. The term is especially applied to the poisonous substances found in the tissues or discharges of an infected individual.

Viscacha (*Lagostomus trichodactylus*), a large rodent found on the Pampas of S. America. The body is from 18 to 21 in. long, and the tail 6 to 8 in. The fur is mottled grey above and yellow on the under parts.

Vischer, Friedrich Theodor (1867-87), a German philosophical writer, born at Ludwig-burg, and educated at Tübingen, where he became *privat-*

docent in 1835, and full professor in 1844. His writings include: *Ästhetik, oder Wissenschaft des Schönen*, 1846-57; *Kritische Gänge*, 1844-75; and *Alles und Neues*, 1881-89. *See* *Lives* by Ziegler, 1893, and Oswald, 1896.

Vischer, Peter (1455-1529), a German sculptor, born in Nuremberg. He executed a tomb of Archbishop Ernest in Magdeburg cathedral (1497), of Prince Frederick the Wise at Wittenberg (1521), and of St. Sebald at Nuremberg (1508-19). *See* C. Headlam, *Peter Vischer*, 1901.

Visconti, the name of a noble Lombard family which for a long time held dominion over Milan. This lordship of Milan was practically established by Ottone, who was appointed to the archbishopric of that town in 1262. He drove out the opposing family of the Della Torres, and left his possessions to his nephew, Matteo. The greater part of the 14th century was taken up with constant quarrels with the papacy, and on more than one occasion the V. defeated the papal troops. During the whole of this century the V. were supreme in Milan, and Galeazzo II. was of such importance that he was able to marry his daughter, and son respectively to the son of Edward III. of England.

French king, and patron of the arts.

Pavia, and was a patron of Petrarch. He was succeeded by the joint sovereigns Barnabo and Gian Galeazzo, the latter of whom was the most powerful of all the V. He spent the greater part of the time in fighting against the various towns of Italy, and was finally made Duke of Milan by the Emperor Wenceslaus for a consideration. His brother who succeeded him, and who was the last of the male V. line, died in 1447.

Visconti-Venosta, Emilio Marquis (1829-1906), an Italian statesman. He commenced his career as a rabid anti-Austrian and Mazzinist; but later renounced Mazzini, although he always remained a strong anti-Austrian. He was associated with Cavour and Garibaldi, and was by the former made an Under-Secretary of State. He took an important part in the movement for the evacuation of Rome by the French, and was also the Director of Foreign Affairs in Italy during the strenuous days of the Franco-Prussian War. His policy and his tact raised Italy high in the council of Europe. He came to an understanding with France on the question of its relations in Tripoli and Tunis and with Austria on the question of Albania and the Adriatic. He was one of the greatest of Italian statesmen during the 19th century.

Viscosity is that property of matter whereby it offers a resistance to a change of shape, the property depending on the rate at which the change takes place. It occurs most markedly in fluids; and is called into play whenever the portions of any fluid, liquid or gas, move with different velocities, the tendency being to destroy any relative motions among the parts of the fluid. Fluids differ greatly in the degree of *V.*: thus some liquors instantaneously take the shape of a vessel into which they are poured, *e.g.* water; while others, *e.g.* treacle, glycerine, take a little time to do so. The former are said to have a very low *V.*, and the latter a high *V.* *V.* is explained by the diffusion of the molecules among the various portions of the fluid, the tendency of the faster-moving molecules to diffuse into the slower motions, and *vice versa*, thus tending to maintain a common velocity for all portions. *V.* causes the fall of a mist through the air to be slow, the subsiding of waves on the sea when the wind falls, and also the hulling of the wind itself.

Viscount (from Low Lat. *vicecomes*, 'in place of earl,' through O. Fr. *viscomite*), the title of the fourth degree of no . . . baron, first . . . John Beaumont . . . the title was given to the deputy sheriff, who acted on behalf of an earl within his estate.

Viscum, a genus of shrubby parasitic plants (order Loranthaceae). The best-known species is *V. album*, mistletoe; but several others are sometimes grown, including *V. cruciatum*, which bears red fruits and generally grows on the olive.

Vishni-Volotchok, or Vyshni-Volochok, a tn. in the gov. of Tver, Central Russia, on the Vishni Canal, 230 m. S.E. of St. Petersburg by rail. It

was invented by Alexander Melville Bell (1819-1905), a lecturer in elocution and philology. The alphabetic characters are themselves descriptive diagrams of the shape of the mouth in pronouncing the corresponding sounds, and words thus printed are calculated to suggest the spoken sounds. In this way deaf mutes have been taught to read aloud and to add to their speaking vocabulary. See A. M. Bell: *Visible Speech; The Science of Universal Alphabets*, 1867; *A Popular Manual of Visible Speech and Vocal Physiology*, 1889.

Visigoths, see GOTH.

Vision, Defects of, may be due to affections of the nervous mechanism of the eye, inflammatory and other transparent media through which light passes, or to disease of the retina or of the optic nerve. Inflammation or other disease of the optic nerve may cause impairment of function of part or the whole of the visual centre. Thus a lesion may cause *hemianopia*, or half-blindness, one side of the visual field in each eye being affected. Toxic influences, such as that of tobacco, are usually responsible for *amblyopia*, in which the visual impressions are dimmed. Paralysis or inflammation of the optic nerve may cause total or partial blindness. *Glaucoma* is a condition of doubtful etiology; various visual defects are experienced, which may proceed quickly or gradually to total blindness. Inflammation of the transparent media leading to exudations naturally occlude the vision. *Keratitis*, or inflammation of the cornea, is the result of injury or is secondary to conjunctivitis. Opacity of the lens may be due to disease of the lens or to disease of the tissues of the eye.

Iritis is a painful and dangerous condition dependent upon a variety of causes, such as injury, constitutional disease, or various kinds of extension of inflammation from other parts of the eye.

though he has gradually tended to engross a larger and larger share of popular attention, his number . . . the number . . . two months . . . those as . . . the latter . . . great part . . . has several . . . but in the . . . they are observed only in Bengal.

Visible Speech, the name of a method of educating deaf mutes by means of symbols representing the position of the organs of speech. It

is a condition of diplopia. . . . this is due to . . . nerves, . . . per cent. . . . id a small proportion of . . . It is due to some defect, . . . in kind, of the nerve trunk.

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VISIONS, see APPARITIONS, SPIRITUALISM, THEOSOPHY.

Visit and Search. In International Law, the right inherent in all belligerent

rents in time of war to stop the private or mercantile vessels carrying the flag of a neutral state and being within the territorial waters (*see TERRITORIAL WATERS JURISDICTION*) of the belligerent or his enemy in order to ascertain whether such vessels are in fact neutral. Warships are not the subjects of this right. The right is exercised by sending an officer on board the suspected vessel to examine the register (*see MERCHANT SHIPPING ACT*), the log, invoices and charter party, and other ship's papers so as to satisfy himself that both the character of the ship and the nature of her cargo are neutral. The late Mr. Hall states that continental jurists are nearly unanimous in maintaining the exemption from V. and S. of *convoyed* ships as an established principle of law, but himself thinks the principle to be evidently inadmissible in authoritative international law, as well as inconsistent with the rights of belligerents and disadvantageous in the long run to the neutrals themselves. From the Parliamentary Papers relative to the Declaration of London it seems, however, that the British point of view yielded to the continental doctrine that the 'neutral vessels under national convoy are exempt from search' (*see also DECLARATION OF LONDON*). Resistance to V. and S. justifies capture. *See Hall, International Law, Chapter x.*

Visitation, Order of the, a religious sisterhood founded in 1610 by St. Francis de Sales. It now follows the rule of St. Augustine, but at its formation had no special vows.

Visitation of the Blessed Virgin Mary. Feast of the, a festival held in the Western Church on July 2, to commemorate the visit paid by St. Mary to her cousin Elizabeth.

Visitor, the officer or superior whose duty it is to visit a corporation, civil or ecclesiastical, in order to see that its rules and regulations are being observed, and that there is no serious default. The visitation of civil corporations is the work of the crown, which acts through the medium of the court of King's Bench. The bishop is the V. of his diocese; but, on account of the number of parishes, the visitation is usually left to the archdeacons. Vs. are also chosen for religious bodies and communities.

Visnea, a genus of evergreen trees (order Ternstroemiaceae). The best-known species is *V. macanera*, which bears small whitish-green flowers in March followed by berries.

Viso del Alcor, a tn. of Spain, 14 m. from Seville, with a mineral spring called Fuente Lanuda. Pop. about 5300.

Viso Monte, one of the Cottian Alps, situated in Italy, at the source of the R. Po. Altitude 12,605 ft.

Vison, *see* MINK.

Visp, or Vispach, a tn. in the canton of Valais, Switzerland, about 5 m. W.S.W. of Briz. Pop. about 900.

Visscher, Cornelis (1629-58), a Dutch engraver on copper-plate, executed many engravings, chiefly after Guido Reni and Ostade.

Vistula (Ger. *Weichsel*, Polish *Wisla*), one of the largest rivs. of Europe, rises in the Beskid Mts. (altitude 3675 ft.) in Austrian Silesia, and flows in a N.W. direction to Schwarzwasser, afterwards passing Craew, whence it is navigable to its mouth at the Frisches Haff in the Baltic. Its chief tributaries are: on the right, the Drewenz, Ossa, Liebe, and San; and on the left, the Przemsza, Pilica, Brahe, Ferse, and Radaune. Length 652 m.

Vit, Vincenzo de (1811-92), a distinguished classical scholar, a native of Padua, famous for his edition of Forellini's *Lexicon Totius Latinitatis* (6 vols., 1858-79). He also compiled a treatise on proper names down to the 5th century, entitled *Onomasticon*, which only reached the letter O, and works on archæology and philology.

Vital Statistics. There are some curiously conflicting facts to be seen in the censuses and registrar-general's reports of Great Britain. It appears that though the birth-rate was down to 1912 steadily on the decline, the death-rate, owing to the constant improvements in sanitation and preventive medicine, has as steadily become lower; and it is safe to say that we, no less than other civilised nations, are gradually becoming a longer-lived people.

Birth-rate of England and Wales.—The birth-rate of England and Wales reached its highest point on record in 1876, and its lowest, so far as England is concerned, in 1912. Wales, however, reached its highest point in 1912. The Scottish birth-rate showed a slight improvement in 1911 and 1912 on the previous five years. It seems doubtful whether the excess of emigration over immigration has very much to do with the falling birth-rate, because that decrease has been in a steady arithmetical progression, whereas the excess above alluded to has varied from 60,000 in the decennial period 1891-1901 to well over 500,000 in the periods 1881-91 and 1901-11. It appears from the most recent quarterly returns of the registrar-general (July and October) that the birth-rate has slightly improved this year (1913). In the annual report (1911) the registrar-general sums up the figures by saying that if the fertility of married women in pro-

portion to their numbers had been as high in 1911 as in 1876-80, the legitimate births would have numbered 1,273,698 instead of the 843,505 actually recorded, giving a legitimate birth-rate of 35.2 instead of 24.4 per thousand of population, as shown in the returns. It must, of course, always be borne in mind that the returns are of crude birth-rates, i.e. stated in terms of total population, regardless of the proportion of females of conceptive ages in the population and of married women. At the same time, no other test is available, notwithstanding that the fertility of potential mothers is only one of the several factors governing the rate of reproduction in a community. The registrar-general points out that when the extent to which fertility diminishes with advancing age is borne in mind, the fall in the proportion of marriages to marriageable persons, and the evidence of postponement of marriage, must have had an appreciable effect in diminishing the birth-rate. This will be seen by the following table:—

Census Year	Proportion per cent. of women aged 15-45 year, in the total population of both sexes and all ages	Proportion per cent. of married women in the female population aged 15-45 years	Of the married women aged 15-45 years, the proportion per cent. at four groups of ages				Persons married to 1000 marriageable persons in the population
			15-20	20-25	25-35	35-45	
1871	23.1	49.6	1.3	13.9	45.5	39.3	56.9
1881	23.1	49.1	1.1	13.7	45.6	39.6	51.1
1891	23.8	47.1	0.9	12.8	46.0	40.3	49.8
1901	25.0	46.8	0.7	11.8	46.8	40.7	48.6
1911	24.9	46.7	0.5	9.4	46.0	44.1	46.2

Death-rate of England and Wales.—The annual death-rate of Great Britain stood at its lowest point in 1910, and it was not much higher in 1911, in spite of the abnormal summer heat of that year, or in 1912. Apart from old age and violence,

gonito-urinary system, forms of tuberculosis other than those above mentioned, measles, diseases of circulatory system other than organic heart disease, whooping cough, diphtheria and croup, and influenza.

lent causes of death in order of severity: Diseases of the nervous system, diarrhoea and enteritis, organic heart disease, phthisis and pulmonary tuberculosis (but if tubercular diseases be taken generally, then the 'white scourge' is easily the most serious cause of death), pneumonia, the cancer premature birth, the

Table showing the Annual Birth and Death Rates of England and Wales for the decennial periods from 1841-1910.

Period	Births per 1000 living at all ages	Deaths per 1000 living at all ages
1841—1850	32.6	22.4
1851—1860	34.4	20.2
1861—1870	35.2	22.5
1871—1880	35.4	21.4
1881—1890	32.4	19.1
1891—1900	29.9	18.2
1901—1910	27.2	15.4

Table showing the annual number of Births and Deaths, and the rates of Births and Deaths per thousand of population in England and Wales from 1900-1911.

YEAR	BIRTHS		DEATHS	
	No.	Per 1000	No.	Per 1000
1900	927,062	28.7	587,630	18.2
1901	929,807	28.5	551,585	16.9
1902	940,509	28.5	535,538	16.3
1903	948,271	28.5	514,628	15.5
1904	945,389	28.0	549,784	16.3
1905	929,243	27.3	520,031	15.3
1906	935,081	27.2	531,281	15.5
1907	918,042	26.5	524,221	15.1
1908	940,383	26.7	520,456	14.8
1909	914,472	25.8	518,003	14.6
1910	896,862	25.1	483,217	13.5
1911	881,136	24.4	527,810	14.6

In 1912 the birth-rate of England and Wales was 23·8; of Scotland, 25·9; Ireland, 23·0. The number of illegitimate births in England and Wales since 1890 has averaged 37,000 annually; from 1875 to 1890 it averaged 42,000; and from 1862 about 45,000.

Infant mortality.—It is at least satisfactory to note that although the population (not birth-rate) is still rising, the total death-rate of infants under one year old is either a constant quantity or decreasing. The rate for the September quarter (1913) was equal to 112 per 1000, being 24 per 1000 below the average in the corresponding quarter of the ten preceding years. It is not so much the death of legitimate as of illegitimate children that is the blot on civilisation. It is not possible, from the registrar-general's returns, to state what the proportion of legitimate to illegitimate was prior to 1906, as the returns draw no such distinction prior to that year. It may be stated generally that in England and Wales that of every 1000 legitimate male infants (under one year) born, about 130 die; of every 1000 legitimate female infants, about 110; of every 1000 illegitimate male and female infants born, 250 and 230 respectively. The mortality of illegitimate exceeds that of legitimate infants most of all in the case of deaths attributed to syphilis; it is slight for infectious diseases in general and negative for whooping cough. It is also slight in the case of death from congenital defects, bronchitis, and pneumonia, but heavy for diarrhoea. The principal causes of death in the case of legitimate children are, in order of severity, diarrhoea and enteritis, premature birth, bronchitis and pneumonia, atrophy and debility, convulsions, tuberculous disease, congenital defects, and whooping cough.

Comparative birth-rate of the world.—Roumania appears to have the highest rate (42 per 1000), after which country follow Jamaica, Ceylon, Culi, Servia, and Hungary (36·40). Austria, Spain, Germany, Italy, Denmark, and indeed most of the old countries of Europe follow the above with an average rate of about 26 per 1000. England, as we have seen, is as low as 24, while Scotland, Ireland, and Scandinavia are not much higher. France ingloriously figures at the bottom of the list with the rate of 18. See *Daily Mail Year Book*, 1914.

Vitalis, Ordericus, see **ORDERICUS VITALIS**.

Vitebsk: 1. A gov. of Central Russia. During the 12th and 13th centuries an independent province, but conquered by the Lithuanians in the 14th century. The area of the country is about 17,500 sq. m. The prov.

is undulating and marshy, lakes being a typical feature of the physical structure. It is fertile; large crops of corn, rye, flax, and potatoes are raised. The timber trade is of great importance; and saw mills, flour mills, and paper mills provide employment for a great part of the population. The greater part of the population are White Russians of the Orthodox Church, the remainder being made up of Letts, Poles, and Jews. Pop. 1,502,916. 2. A tn., cap. of gov. of same name, situated on the W. Dwina, about 78 m. N.W. of Smolensk. It is a cathedral town, and boasts many fine churches. As a river port it is fairly important. It manufactures candles, tobacco, and woollen and linen cloth. Pop. about 67,000, of whom a large percentage are Jews.

Vitellius, Aulus (15-69 A.D.), Roman emperor, of the Augusti, and Nero. He became the commander of the Roman legions on the lower Rhine; being appointed by Galba, the successor of Nero. In 69 A.D. he was proclaimed emperor by the legions, with whose aid he defeated the supporters of Otho. His gluttony and general ill-living made his reign short, and on the proclamation of Vespasian he was captured and murdered in Rome.

Viterbo, a tn. in the prov. of Rome, Italy, about 41 m. N.W. of Rome. It is encircled by old Lombard walls, and contains Etruscan antiquities. Pop. about 21,300.

Vitet, Ludovic (1802-73), a French politician and man of letters. He began by writing art and literary criticisms in *Le Globe*; where he championed the cause of the French Romantics, then beginning to make themselves heard. In 1831 V. was appointed by Guizot to the post of director of historic monuments. He was elected as a deputy in 1834. In politics he was a Conservative.

Vitex, a genus of deciduous and evergreen trees and shrubs (order Verbenaceæ) bearing white, lilac, blue, and purple flowers in cymes. *V. Agnus-Castus*, the tree of chastity, is a native of S. Europe and is half-hardy in Britain.

Viti Islands, see **FIJI ISLANDS**.

Vitis, a genus of creeping or climbing shrubs (order Ampelidaceæ) with small fragrant flowers followed by berries. *V. vinifera* is the vine (q.v.). A number of species are grown for their ornamental foliage on trellis work, pergolas, and walls; one of the finest is *V. coignetiae*, which has large handsome leaves that are beautifully tinted in autumn. A very hardy species is *V. labrusca*, fox grape, which

bears heart-shaped purple or yellowish leaves, and has been of great value in raising new varieties of grape-vines on account of its resistance to Phylloxera.

Vitoria, or **Vittoria**, an episcopal city, cap. of Alava prov., N. Spain, 31 m. S.S.E. of Bilbao. Its cathedral dates from 1181. It is the site of Wellington's victory over the French in 1813. Pop. (1910) 32,377.

Vitré, a tn. in the dept. of Ille-et-Vilaine, France, about 22 m. E. of Rennes. It is a mediæval town with an old castle. Pop. (est.) about 10,500.

Vitrified Forts. Forts or camps found in many parts of Western Europe and the British Isles; built of stone blocks, many of which seem to have been compacted together by fire. Many theories have been put forward in order to explain the formation. The two chief theories are: (1) that they have been vitrified accidentally; (2) that they are the result of volcanic action. The former theory is substantiated to a certain extent, since the action of camp fires and watch fires may quite easily have caused the solidification. It must be remembered that this vitrifying process is observable only in places, and that much of the stone work that is found in these vitrified forts is loose. The volcanic theory has been practically disproved. The exact period when these forts were erected cannot be determined; but we have examples which date back to Roman times, if not earlier. See Ferguson, *Story of the Irish before the Conquest*; Munro, *Prehistoric Scotland*, 1899.

Vitrina, or **Glass Snail**, a genus of molluscs with very thin shells. The animal is too large to retract its whole body into the shell.

Vitringa, **Campegius** (1659-1722), a divine and commentator, born at Leuwarden, studied at Franeker and Leyden. Was created D.D. (1680), professor of oriental languages (1681), and professor of theology in the university at Franeker (1683). Among his excellent and crude works are: *Commentarius in Jesaiam*; *Vetus Synagoga*; *Anac.*; *Commentarius in I.*; *lationes Sacrae*; *Propheticae*, etc.

Vitriol, see **SULPHURIC ACID**, **COPPERAS**, **WHITE VITRIOL**, etc.

Vitro - **Varnish Painting**, an art practised in Venice in the 15th century, but now almost lost. Varnish highly coloured for painting was mixed with 5 to 10 per cent. of burnt-glass powder, the resulting substance being applied with a fine brush (as in gesso-painting) to any surface. When dry the effect pro-

duced was that of glass in relief. Water-glass (a solution of sodium) may be used with the same result.

Vitruvius, or **Marcus V. Pollio**, a Roman architect and writer, military engineer under Julius Cæsar in the African War (46 B.C.), and inspector of military machines under Augustus, to whom he dedicated his *De Architectura* (completed about 16-13 B.C.). This work is largely compiled from Greek authorities, and treats of architecture (books i.-vii.), water and aqueducts (book viii.), sundials (book ix.), machines and military engines (book x.).

Vitry-le-François, an arron. and tn. of Marne dept., N.E. France, 19 m. from Châlons-sur-Marne, at the beginning of the Rhine-Marne Canal, called after its founder, Francis I. (1545). It trades in wine, grain, cement, wood, and iron. Faïence ware is manufactured. Pop. about 8000.

Vitry-sur-Seine, a tn. of Seine arron., Seine dept., France, about 2 m. from Paris. It has nursery-gardens of ornamental and fruit trees. Pop. about 10,000.

Vittoria, a tn. of Treviso prov., Venetia, Italy, 20 m. from Treviso, formed (about 1879) by union of the rival towns Ceneda and Serravalle. Silk and cement are manufactured, and there are saline and sulphur springs. Pop. (est.) about 19,140. (tn.) 2980.

Vittoria, a tn. of Syracuse prov., Sicily, on the Camarino, 14 m. from Modica, founded (1605) and named after Vittoria Colonna. There is trade in wine, soda, and ashes. Pop. (with Scoglitti) about 32,220. See also **VITTORIA**.

Vittoria Colonna, see **COLONNA**, **VITTORIA**.

Vitus, a Roman saint who suffered martyrdom under Diocletian, and whose day is celebrated on June 15. His aid is invoked against St. Vitus's dance (*Chorea*), hydrophobia, and other complaints.

Vivaldi, **Antonio** (c. 1675-1743), a violinist and composer, born in Venice; from 1714 was in St. Mark's orchestra. He developed the con-

certo, writing about eighty; besides over thirty operas, many violin sonatas, and some choral music.

Vivandière, a female trader who attended French or Continental regiments with refreshments, comforts, etc. She is now displaced by the canteen.

Vivarial, a family of Italian painters of Murano, Venice. The most prominent members were: **Antonio** (fl. mid-15th century), the probable founder; **Bartolommeo**

(fl. 1450-99), the pupil of Antonello of Messina, who taught him to paint in oils; and *Luigi* or *Alvise* (c. 1446-1502), a portrait painter.

Vivero, the cap. of Vivero dist. and seaport of Lugo prov., Galicia, N.W. Spain. Flax-weaving, fishing, and coasting-trade are carried on. It is on an estuary in the Bay of Biscay. Pop. about 12,850.

Viverra, see **CRIVET**.

Vives, Juan Luis, more commonly known as *Ludoricus Vives* (1492-1540), a Spanish scholar and educationist, born at Valencia. He became professor of humanities at Louvain (1519), and four years later was appointed tutor to Princess Mary of England, for whom he wrote *De ratione studii puerilis epistolæ duæ* (1523). Having opposed Henry VIII.'s divorce, he withdrew to Bruges. His works include *De Tradendis Disciplinis* (see translation by Foster Watson, *Vives on Education*, 1913), *Linguae Latinae Exercitatio*, 1539; *De Causis corruptarum Artium*, 1539, and *Tudor Schoolboy Life, the Dialogues of Juan Luis Vives* (Eng. trans. by Foster Watson, 1908).

Viviani, *Vincenzo* (1622-1703), an Italian mathematician of a noble Florentine family, pupil of Galilei. He gained a European reputation, being made chief engineer by the Grand-duke Ferdinand, pensioned by Louis XIV., and elected foreign associate in the Académie Royale des Sciences, and Fellow of the Royal Society of London.

Vivien, or *Viviane*, a beautiful enchantress of the Arthurian legend, mistress of the famous sorcerer Merlin, over whom she cast her spell, depriving him of his power and imprisoning him in a thicket of thorn. Her palace was in the midst of a magical lake, hence she is sometimes called the 'Lady of the Lake.' See Tennyson, *Idylls of the King*; Dunlop, *Hist. of Prose Fiction*, i.; Price, *Literary Remains*, i.

Vivien de Saint-Martin, Louis (1802-97), a French geographer, born at Caen. He published: *Carte Electorale*, 1827; *Tables Chronologiques et Géographiques de France*. He translated the works of Sir Walter Scott (1836-39), and was the author of *Histoire de la Révolution Française* and *Histoire de Napoléon*. His two masterpieces are the *Nouveau Dictionnaire de Géographie universelle*, and *Atlas Universel* to illustrate his *Histoire de la Géographie*.

Vivisection, the dissection of, and experiment upon, living animals. V. is an ancient practice, Galen being one of its exponents. It is claimed that by V. alone was it possible to discover much physiological and patho-

logical knowledge, e.g. the circulation of the blood and the value of therapeutics. This, however, is denied by many, who say that nothing has been discovered with the aid of V. that could not have been discovered without it. So the arguments developed, until in 1876 a royal commission was appointed to investigate the problem. This was followed by an Act which provides inspectors to visit registered places where V. is allowed—and then only for a useful purpose, or in very limited cases for the purposes of instruction—by persons who must possess a licence issued by the Home Secretary. See the publications of the Anti-Vivisectionist Society. Against: Tait, *Uselessness of Vivisection*; Miss F. P. Cobbe, *Modern Rack*; Nicholson, *Rights of an Animal*. For: Gore, *Morality of Vivisection*; S. Paget, *Experiments on Animals*.

Vivonne, Catherine de, see **RAMBOUILLET**.

Vizagapatam, the cap. of a dist. of the same name in Madras, India, situated on the E. coast, N. of Dolphin's Nose. The European quarter is in the suburb Waltair. Manganese ore, native cloth, ivory, and rice are exported. Pop. 41,500. In the district of Vizagapatam, rice, sugarcane, tobacco, and cotton are grown. Area 17,222 sq. m. Pop. 3,000,000.

Vizcaya, or *Biscaya*, one of the three Basque provs., N.W. Spain, on the Bay of Biscay. It has valuable deposits of iron ore. Area 836 sq. m. Pop. (1910) 348,684. Cap., Bilbao.

Vizetelly, Henry (1820-94), an English publisher and pioneer of the illustrated press, was born in London of Italian extraction. He started the *Pictorial Times* (1843) and the *Illustrated Times* (1855), and became Paris correspondent to the *Illustrated London News* (1865)—afterwards publishing *Paris in Peril* (1882), an account of the siege. He established a publishing firm in London (1879), which issued translations of French novels. He translated most of E. Zola's novels. See autobiography, *Glances back through Seventy Years* (1893).

Vizeu, or *Viseu*, the cap. of Vizeu prov., Beira, Portugal, 50 m. from Oporto. It has a 12th-century cathedral and remains of the Roman Campo de Viriato near by. There is an annual fair in September. Pop. about 402,260.

Vizianagram, or *Vizianagaram*, a fortified tn. of Vizagapatam dist., Madras, British India, 17 m. from Bimlipatam. It has a military cantonment and the residence of a 'zamindar.' There are fine buildings, including a college. Pop. c. 37,270.

Vizier (Arabic *Wazir*), a title first given to the chief minister of the Abbaside caliphs, and since spread among most Oriental nations.

Vizille, a tn. in the dept. of Isère, France, situated on the Romance, in the arron. of Grenoble. In its castle the Dauphiné deputies assembled (1788) just before the outbreak of the Revolution. Pop. 4300.

Vlacq, Adrian, a Dutch mathematician of the 17th century, who composed and printed books of logarithms, which had been recently invented. He translated and added to Briggs's *Arith.* and translated also produced:

metria Artificialis (1633), containing tables long used on the continent.

Vladikavkaz, the cap. of Terek prov., Ciscaucasia, Russia, on Terek R. and N. slope of the Caucasus, 50 m. from Mozook. It is an important military station with active trade. Pop. (1910) 76,486.

Vladimir: 1. A gov. of Central Russia, having Moscow on the W. and Nizhni-Novgorod on the E., and containing about 19,000 sq. m. It is situated in the Volga basin, undulating and fairly fertile. Minerals are worked, chiefly alabaster and porcelain clay. Good crops of rye, oats, barley, potatoes, and flax are raised; and the fruit-growing industry is increasing rapidly every year. The gov. is industrially of great importance, ranking only after those of St. Petersburg and Moscow. Flax, cotton, and cloth form a large p.

Almost all the Russians and

Pop. 1,570,733. 2. A tn., the cap. of the gov. of same name, situated about 100 m. N.E. of Moscow. It is the seat of an archbishop and contains many fine churches. Two of these churches, those of St. Demetrius and of the Nativity, date back to the 12th century. As a riv. port it is important, and has dye works and cotton mills. Pop. about 32,000.

Vladimir I., Grand Duke of Kiev, called also St. Vladimir and Sunny Vladimir (980-1015), a warrior prince of Russia who at the head of a band of Vikings, collected principally in Scandinavia, did much to establish a strong duchy. V. was converted to Christianity and became a member of the Greek Church, thus giving practically national sanction to the religion which is still retained by Russia. In this way he became the 'hero' of the monks.

V. (1052-1125), early Russian who was able to unite most of the tribes and then to-

gether for the protection of Russia. After his death the importance of the duchy of Kiev rapidly lessened.

Vladimir Volhynskiy, a tn., of Volhynia gov., S.W. Russia, dating from the 9th century. It is 17 m. N.E. of the spot at which the Polish, Russian, and Galician frontiers meet. There is trade in cattle and corn. Pop. about 9000.

Vladivostok, the cap. of the prov. of Russian Siberia, and an important naval port on the Pacific. It is the Eastern terminus of the Trans-Siberian Railway. It is a garrison town, and the pop. (1906) of 41,862 is made up of Chinese, Koreans, and Russians.

Vleughels, Nicholas, (1669-1721), a French painter, born at Valenciennes. He lived afterwards at Paris, and his death occurred at Rome. There are pictures of his in the Toulouse Museum and the Hermitage at St. Petersburg; but he is remembered chiefly as having been an intimate friend of Watteau, with whom he shared a studio at one time.

Vlissingen, see **FLUSHING**.

Vodena, or **Vodina** (ancient *Edessa*), an archiepiscopal see and tn. of Salonica vilayet, Rumelia, European Turkey, 10 m. from Monastir. Tobacco, cotton, wool, and leather are manufactured. There is trade in red pepper, silk cocoons, and wine. Pop. about 25,000.

Vodka, Russian brandy, the national spirituous drink of Russia. Originally it was distilled from rye, but maize and potato spirit are often used. It contains about 50 per cent. of alcohol, and has such a strong flavour that it does not recommend itself to people other than Russians. The effects of V.-drinking among those who cannot purchase spirit of good quality constitute one of the social problems of Russia. The sale of V. is a government monopoly.

Voethus, or **Voet**, **Gisbert** (1588-1676), and his sons, **Paul** and **Daniel**, were distinguished members of the University of Utrecht. Gisbert was born at Heusde, studied at Leyden, and took orders, becoming minister of Heusde till 1631. Professor of theology and oriental languages at Utrecht, he advocated the doctrines of the Synod of Dort; and was an ardent controversialist, attacking Descartes, Cocceius, and any non-Calvinist. Paul, born 1619, taught logic, metaphysics, Greek, and civil law at Utrecht, and published juridical and theological works. Daniel, born 1629, was professor of philosophy at Utrecht, and published several text-books.

Vogel, **Sir Julius** (1835-99), a journalist, colonial financier, and statesman, born in London. Settled in

Victoria in 1851 as a journalist, and in 1861 tried his fortunes in New Zealand. He entered the Provincial Council of Otago in 1862, and in 1866 was at the head of the provincial government. His great life work was to revive the fortunes of New Zealand after the disastrous war between the North and South Islands of 1866-70. He negotiated a loan with England of over £20,000,000, and thereby developed the natural resources of the colony, and attracted a great influx of immigrants. He also rendered valuable services in the New Zealand telegraph and postal arrangements, in railway development, and also in colonial defence. Notwithstanding all his zeal and ability he died a poor man. See also *Times*, March 4, 1899.

Voghera (ancient *Iria*), a tn. of Pavia prov., Lombardy, N. Italy, 16 m. from Pavia, on the Staffora. Silk, corn, and wine are produced. Pop. about 14,450.

Vogler, Georg Joseph, the Abbé (1749-1814), a German organist and composer, born at Würzburg of musical parents, and early showed an aptitude for music. Studied music and theology and was ordained priest (1773); founded a school at Mannheim, where he met Mozart. Travelled widely (1780-99), probably visiting England. Founded schools at Stockholm and Darmstadt. A great extempore organist. Browning made him the subject of a poem (*Abt Vogler*).

Vogt, Carl (1817-95), a Swiss naturalist and biologist, born at Giessen. Studied medicine at Giessen and Berne. Appointed professor of zoology at Giessen (1847). Expelled from Germany for holding Radical views (1848), he became professor of geology at Geneva (1852), which position he retained till death. Entered the Swiss Parliament as a Radical (1878). He was one of the earliest scientists on the continent to see the importance of Darwin's and Wallace's discoveries, some of which he had made independently. He wrote largely on subjects of biological, zoological, and anthropological interest. For his relation to Darwin see *Quatre-fages de Bréau, Les Emules de Darwin*, 1894. See also *Lives* by B. Weber and A. von Wurzbach.

Vogüé, Charles Jean Melchior, Marquis de (b. 1829), a French archaeologist and diplomatist, born in Paris. After explorations in Syria and Palestine, he became a member of the Academy of Inscriptions (1868). He was ambassador at Constantinople and later at Madrid, but resigned in 1879. The French Academy elected him a member in 1901. Among his works are: *Les Eglises de la Terre Sainte, Le*

Temple de Jérusalem, Mémoires de Villars, Le Duc de Bourgogne et le Duc de Beau-Villiers, and Mélanges d'archéologie.

Vogüé, Eugène Melchior, Vicomte de (1848-1910), a French historian, cousin of above, born at Nice. He wrote for the *Revue des Deux Mondes* and the *Journal des Débats*. From 1888 he was a member of the Academy. Deputy for Ardèche (1893-98). His chief works are *Le Roman Russe* (Eng. trans. by H. A. Sawyer, 1913), *Histoires Orientales, Chez les Pharaons, Histoire et Poésie, Jean d'Agrève, Les Morts qui Parlent, and Le Maître de la Mer.*

Vohwinkel, a vill. of Mettmann circle, Düsseldorf gov., Rhenish Prussia, 4 m. from Mettmann. Pop. about 9100.

Voice and Voice Training. Voice is the production of sound by means of vocal cords or membranous reeds situated in the larynx. The pitch of a voice varies with the size of the larynx—the smaller the larynx the higher the pitch. There are six distinct types of voice, classified according to timbre (i.e. quality of tone) rather than to pitch—(male) bass, baritone, tenor, and (female) contralto, mezzo-soprano, and soprano, the latter approximating to a boy's treble. Middle female voices should really be classified as mezzo-soprano and mezzo-contralto, since they vary considerably. A similar suggestion has been made regarding male voices; but the baritone is, strictly speaking, of bass timbre, although higher in pitch. Most voices have a compass of approximately two octaves, less commonly of three; but the tone-quality of a voice is not consistent throughout its compass. The upper 'register' (i.e. series of notes of similar quality), or 'head' voice (*roce finita*), as opposed to the lower register or 'chest' voice (*roce piena*), demands a different process of production. In head voice, the pitch is raised by gradually relaxing and shortening the vocal reeds, in chest voice by increasing both tension and length, the variations in length being in both cases infinitesimal. There is no physiological justification for the commonly accepted division of the voice into three registers, head, medium, and chest. The transition from one register to another must be made without violent change of timbre; the successful accomplishment of this, as of almost everything else in singing, depends principally on correct breathing. Especially should a singer refrain from producing head notes with the chest and *vice versa*, and as the registers overlap to some extent, this is practically unnecessary. In breath-

ing the chest should be raised and the abdomen drawn inwards, breath being taken through the nose as gradually as possible. The

the passage of air through the vocal cords should be 'placed' or focused on that part of the roof of the mouth which adjoins the upper front row of teeth (i.e. the frontal hard palate). There is the widest divergence of opinion as to the correct poise and shape of lips, etc.; generally speaking, however, unnatural positions and muscular tension should be avoided. See Albert Bach, *Principles of Singing*; Henderson, *Art of the Singer*, etc.

Void and Voidable, a void contract or deed is one that has no legal or binding force whatever owing to some radical defect. A voidable contract or deed, on the other hand, is one that is valid unless, and until, it is adjudged invalid for some flaw.

Voiron, a tn. of Isère dept., France, on the Morge, 14 m. from Grenoble, noted for cloth manufs. Silk, paper, straw, tools, and chemicals are also manufactured. It formed part of Savoy till 1355. Pop. about 12,625.

Voiture, Vincent (1598-1648), a French poet and letter-writer, born at Amiens. He belonged to the Pléiade.

D'Avaux, Anne of Austria, and Mazarin, and was an original member of the Academy. His poems and *vers de société* were published after his death, the first edition appearing in 1650. Later editions are those of Ubicini (1855) and Roux (1856), and *Lettres* by Uzanne (1880). See Sainte-Beuve's *Causeries du Lundi*.

Volans, a southern constellation S. of Argo, formed by Bayer (c. 1603), γ, ε, ξ, are double.

Volapük, one of the earliest artificial languages, was invented in 1879 by Johann Martin Schleyer, a pastor of Constance, Baden. The word is coined from *world* and *speech*. The vocabulary of V. is borrowed from Latin, the Romance languages, and chiefly from English. It is inflectional, the grammar and syntax being partly borrowed and partly original. It was taken up by educationists and spread to Paris (c. 1885), and in 1887 was recommended by the London Philo-

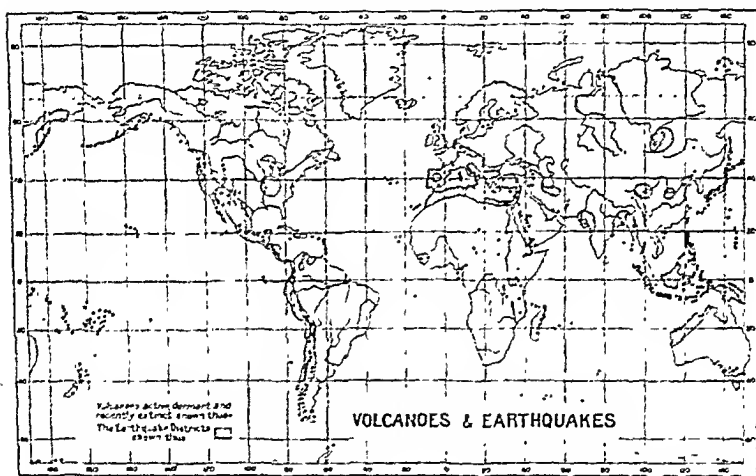
been superseded by Esperanto (q.v.). Consult Sprague's *The International Handbook of Volapük*, and similar works by Schleyer, and Harrison.

Volcanoes. A V. is a vent in the earth's crust from which lavas and ashes, etc., are ejected. If the vent is in the form of a fissure it is not commonly called a V. The term V. is generally restricted to those conical mountains which are built up by material ejected from a fissure by means of a central throat or pipe. At the top of the cone is a pit-shaped opening called the 'crater.' An ideal section of a V. would show that the cone was built up of layers of lavas and ashes, these layers being built up around the central pipe by off-repeated eruptions. Vs., however, exhibit two great types of eruption: (1) The explosive type; (2) The quiet type. In the former the materials are ejected with explosive violence, while in the latter the lava rises up into the crater and flows over the rim or breaks through the sides. Of the first type we may mention Stromboli. The cone of this V. is built up from the bottom of the Mediterranean sea, and is about a mile high, although little more than half projects above the water. Steam issues constantly from an opening about 1000 ft. from the top. In the floor of the crater are cracks in which lava may be seen in constant ebullition. Fragments of the lava are occasionally hurled into the air. The best-known V. is probably Vesuvius, near Naples. Previous to 79 A.D. Vesuvius was only a conical mountain with a deep crater about 3 m. in diameter at the summit. In that year a most destructive explosion occurred, preceded by several violent earthquakes, and the towns of Herculaneum and Pompeii were buried in the dust which fell. By this explosion a large part of the walls of the crater was blown away; the part left standing constitutes the crescent-shaped elevation known to-day as Monte Somma. During the eruption of 79 A.D. no lava was emitted. Since this outburst, Vesuvius has had other violent eruptions separated by periods of quiescence. As a general rule the longer the period of quiescence, the more explosive is the following eruption. Important eruptions have taken place in 1737, 1794, 1822, 1872, and 1906. The cumulative effect of all these outbursts by which lavas and ashes have been ejected, has been to build up a newer cone and crater within the broken ring of Monte Somma. Smaller volcanic cones exist in the Phlegrean Fields near Naples, and these, nearly

simplification of its forms and grammar for commercial correspondence, to which suggestion, however, Schleyer was strongly opposed. Such dissensions prevented V. from becoming universal, and it has now

extinct, discharge only carbon dioxide and sulphurous gases. This stage is known as the solfataric stage. The eruption of Krakatoa, between Java and Sumatra, which took place in 1883 after a period of 200 years' quiescence, was an eruption of extremely explosive violence. As a result of this outburst the whole of the northern and lower part of the island disappeared, and half of the cone of Rakata was blown away. The ashes were projected some 200 m. into the air, and were carried all round the world, causing most brilliant sunset effects in many places. Enormous sea waves were caused which travelled half-way round the earth and which did inestimable damage to the coasts near the island.

the quiet type. Mauna Loa is the largest of four volcanic cones in the island of Hawaii, and is 14,000 ft. above the sea. During an eruption the lava flows out from fissures in the side of the mountain in streams which are sometimes half a mile in width, and flow for 50 m. Little steam is discharged and there are no showers of dust or explosive reports. In Iceland three types of eruptive vents are considered: (1) Cones built of ash and lava; (2) cones built of lava alone; (3) chains of craters. The first two correspond to the Vesuvian and Hawaiian types. The third type is common in Iceland. Volcanic cones are arranged along fissures running S.W. and N.E. Enormous floods of lava are often emitted from these



The cause of the eruption is attributed to the sudden escape of superheated steam. In 1902 two eruptions occurred in the islands of St. Vincent and Martinique in the W. Indies, the phenomena being practically the same in both cases. The V. La Soufriere in St. Vincent, contained a crater lake smelling strongly of sulphurous gases. After premonitory warnings in the shape of earthquake shocks, the crater lake boiled over, and the next day a huge cloud of incandescent dust rolled down the mountain side, destroying everything in its path. Similarly, in the eruption of Mont Pelée, a cloud of incandescent dust descended upon the town of St. Pierre, which was blotted out in a moment, and 30,000 of the inhabitants killed. In the Hawaiian Islands the volcanic eruptions are of

erater chains as in the eruption of Laki in 1783, when two streams of basalt lava with maximum widths of 15 m. and 7 m. flowed for a distance of 50 m. Eruptions which are strictly not from Vs. are those described as fissure eruptions. These are lava flows which cover thousands of square miles, and are known in the basin range of N. America (Snake River plains), in the Deccan plateau of India, and in the basalt plateau of N.W. Europe. Regarding the occurrence of Vs., it is found that though a few occur isolated, yet as a rule they are met with in extended lines with comparatively short distance from the sea, and are usually situated on important lines of fracture, i.e. generally where the surface of the earth's crust is steepest. The lines of Vs. are generally parallel

to the shores of the continents, and they form a complete 'Girdle of Fire' round the Pacific Ocean. From the southern extremity of the continent of America, active Vs. extend through the Andes, through Mexico and California to Alaska then through

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the Vs. of Iceland, the Azores, and the Canaries, and another line is formed by the Vs. of the Mediterranean. Extinct Vs. also occur in many other regions. The agents causing volcanic eruptions heated waters or their gases. The water is regar-

tained in the molten magma under extremely high pressure, and the eruptions are caused by the sudden expansion of large volumes of steam, which escape along lines of weakness. Intimately associated with Vs. are Geysers (q.v.). For reference see Judd's *Volcanoes*, also works on the subject by Scrope and Daubeny. See also Chamberlin's, Salisbury's, and Geikie's *Textbooks of Geology*. See AGGLOMERATE, BOMB, LAPILLI, etc.

Volci, or **Vulci**, an ancient Etruscan city, situated some 55 m. N. of Rome, Italy. Its inhabitants were defeated by Coruncanius in 280 B.C. Since 1828 excavations have been made, and in its necropolis Greek bronzes and painted vases have been found.

Vole, a name, probably of modern origin, given to various species of rodents. The water V. or water rat (*Arvicola amphibius*) is about 1 ft. long, from nose to tip of tail. Its fur is thick and shining, rich reddish brown above and yellowish grey beneath. Its feet are not webbed, although it takes readily to water. It feeds chiefly on the stalks of sedges and other aquatic plants, and is of service in helping to keep water courses clear. By some authorities the

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losses to crops. It is destroyed in great numbers by owls and kestrels.

Volga, The (the *Rha* of the ancients), the longest river (2325 m.), and one of the chief waterways, of Europe. It lies entirely in Russia, and rises in the Valdai Hills of Tver, eventually reaching the Caspian Sea at Astrakhan by as many as 200 mouths. The main directions from the source are

E., S. (from Samara), and from Tsaritsyn S.E. After the Oka (from the S.), and the Kama (N.), both of which are longer than the Rhine (760 m.), the chief tributaries are the Shchekna, Unzha, Vetluga, and Akhtuba. The affluents together are navigable for as many as 20,000 m., whilst the main stream is navigable to within 65 m. of its source. The first commercial ports on the V. are Astrakhan, Tsaritsyn, Rybinsk, Nizhni-Novgorod, and Saratov; whilst Tver, Yaroslavl, Kostroma, Kazan, and Samara are also on its banks. In spite of the fact that it is ice-bound from 90 to 160 days each year, this river is one of the great arteries of commerce for the products of central Asia as well as of the Russian empire. It has opened up direct com-

munication with St. Petersburg, Riga, and Archangel.

Volhynia, a gov. of S.W. Russia, bordering on the Polish governments on the W., Minsk on the N., Kiev on the E., and Galicia on the S. The surface of the country is, on the whole, quite flat, but in the W. the country is given a hilly appearance by a spur of the Carpathians. The government is divided into twelve districts. The pop. is well over 3,500,000, and the peasantry are perhaps better off here than in any other part of Russia. Its area is roughly 28,000 sq. m. Timber provides the chief occupations of the inhabitants, who are principally Little Russians.

Volition, see WILL.

Volkovysk, a tn. in the gov. of Grodno, 44 m. S.S.E. of Grodno, in Russia. Pop. 10,684.

Volkstrost, the centre of an agricultural dist., quite close to the northern boundary of the Transvaal, 175 m. S.E. of Johannesburg. Pop. (1904) 2382.

Villon, Antoine (1833-1900), a French painter. He studied art under Ribot, and, like him, achieved his finest work in the domain of still-life; but he also practised portraiture, and did a few landscapes. There are pictures by him in the Louvre and the G.

Volney, a French philosopher and writer. He was born in Anjou.

Syria (1782-86), and after his return published *Voyage en Egypte*. Elected member of the National Assembly, Constituent Assembly, and the Convention. He suffered imprisonment, but regained liberty on the overthrow of Robespierre, and soon after was appointed professor of history at the Ecole Normale. His most

famous work is *Les Ruines, ou Méditations sur les Révolutions des Empires*, 1791. See Sainte-Beuve's *Causeries du Lundi*, and a monograph by Berger.

Volo, a seaport on the Gulf of Volo, with a museum of antiquities, in Thessaly, Greece. There are thriving industries and commerce. Pop. (1907) 23,563.

Vologda, a gov. and its cap. in N.E. Russia. The gov. stretches for 800 m. from Novgorod to the Urals and has an area of 155,265 sq. m. In the N.E. rise the tallest peaks of the Urals, and in the N. is a swampy plateau comprising the Timan highlands. From the S.W. flows the Sukhona, from the N.E. the Vychegda, and in the E. the Pechora. A characteristic feature of the landscape are the 'parmas,' or marshy, wooded plateaus. Cereals and flax are cultivated, and the timber trade (especially in firs) is important. Pop. (1911) 1,651,200. The tn. lies on the Vologda, 127 m. N. of Yaroslav by rail. There is considerable commerce in linseed, flax, oats, and dairy produce. Pop. (1904) 32,349.

Volpato, Giovanni (1733-1803), an Italian engraver, was a pupil of Bartolozzi in Venice and afterwards settled down in Rome, where he engraved the masterpieces of Raphael and Michelangelo in the Vatican and also some paintings of Caracci.

Volpi, Gian Antonio (1686-1766), an Italian classical scholar and publisher, was professor of philosophy and rhetoric at the university of his native city of Padua. The joint-owner of a printing press with Gattano, his brother, he brought out excellent editions of Catullus (1737) and Tibullus and Propertius, besides issuing a treatise on Roman satire (1744).

Volsci, an ancient Italian people of E. Latium, akin to the Oscans and Umbrians, dwelling on both sides of the Liris down to the Tyrrhene Sea. They were at war with the Romans to the 5th and 4th centuries B.C. and often allies of the Æqui, but were subdued (338) and made Roman citizens by 304. Coriolanus defeated them at Corioli (c. 490 B.C.). The Hernici dwelt E., the Aurunci and Samnites to the S. Among their towns were Antium, Satrium, Arpinum, Norba, and Velitree (Velletri), birthplace of Augustus. See Smith, *Dictionary of Greek and Roman Geography*.

Volsk, a tn. on the Volga, 80 m. N.E. of Saratov, in Russia. There are market gardens. Pop. 27,572 (1900).

Volsungs, a heroic race (prominent in old Germanic and Norse sagas), the founder of which was Volsung, the

grandson of Odin. See Morris, *Story of Sigurd the Volsung*, 1898.

Volt, the practical unit of electromotive force (E.M.F.) in electricity. It was defined by order in council (1894) as having 10^8 absolute units in the C.G.S. system; and as being that electrical pressure which, when applied to a conductor whose resistance is 1 ohm, will produce a current of 1 ampère. It is represented by 0.6974 of the pressure between the poles of a Clark cell at 15° C. The voltage of a system simply means the difference of pressure exerted on the system measured in volts.

Volta, Alessandro, Count (1745-1827), an Italian physicist, noted for his discoveries in electricity. He became professor of natural philosophy at Pavia University (1774-1804); at Padua (1815), retiring 1819. V. travelled in Switzerland (1777), through Tuscany (1780), in Germany, Holland, and England (1782)—where he met Banks and other distinguished men. He invented the electrophorus (see Rosier, *Journal de Physique*, 1776; *Phil. Trans.*, 1778), an electrical condenser (1782), and the hydrogen lamp (1777). His most noted discovery was, however, that of the development of electricity in metallic bodies (see *Phil. Trans.*, 1793); repeated experiments leading to the invention of an electrical battery, and later of the 'Voltaic' (or Galvanic) pile (see *Phil. Trans.*, 90. 1800). A collection of his works was published (1816). See Bianchi and Mochetti. *Vita*, 1829-32; Volta, *A. Volta*, 1875. Cf. ELECTRICITY, GALVANI.

Volta, Aswada, or Adirri, a riv. of French Sudan and Upper Guinea, W. Africa, between the Niger and the Gambia. The two main upper branches are called the Black V. and the White V. Rising in the Kong Mts., it flows S.E. and S. (c. 900 m.) through the Gold Coast to Adda. There are rapids above Akuse, and a bar at the mouth.

Voltaic Cell, see CELL, VOLTAIC.

Voltaire, Jean François Marie Arouet de (1694-1778), a sceptic, dramatist, and historian, born in Paris, his father being an official in the *Chambre des Comptes*; educated at the Jesuit Collège Louis le Grand. At an early age his precocity won him the support of Ninon de l'Enclos; and by the age of eighteen his literary abilities had gained him entrance into the most brilliant intellectual circles. In 1715 he was banished, and on his return in 1717 imprisoned in the Bastille for writing a scurrilous lampoon on the regent. He had already written the tragedy *Œdipe*; and on his release in 1718 it was performed with brilliant success. He now

assumed the pseudonym of 'Voltaire.' In 1723 the poem on Henri IV., which had been censored in Paris for its anti-papery, was printed at Rouen; the following year, the play *Mariamne* was produced. About this time another court quarrel resulted in further imprisonment until 1726, when he was exiled to England. Here, as the protégé of Bolingbroke, he was welcomed in circles of intellect and became versed in English politics, literature, and philosophy—the latter especially stimulating his scepticism. On his return to Paris (1729) he realised a fortune by speculation; and in 1734, threatened with arrest for his *Lettres Anglaises* (published without his authority), he retired with his mistress Madame de Châtelet (and her *mari complaisant*!) to his château at Cirey, Champagne. By this time he had already produced the *Lettres Philosophiques*, *Histoire de Charles XII.*, and *Épître à Uranie*. At Cirey he wrote the plays *Alzire*, *Mérope*, and *Mahomet*; the poetical satire *La Pucelle*; *Treatise on Metaphysics*; a thesis on Sir Isaac Newton: part of *Siècle de Louis XIV.*; *Les Mœurs et l'Esprit des Nations*; *Zadig*, and other eastern tales. Meanwhile, V. had become the intimate correspondent of Frederick the Great. Madame de Châtelet died in 1749, and the following year V. visited Frederick at Berlin. Here he was entertained in great style, his chief occupation being to correct his patron's writings; but a di-temperament led to V.'s in 1753. The *Siècle de Louis* was completed about this time. From 1755 onwards, V. spent his time at Geneva, beginning his anti-Christian writings in 1762. Other works of the period include *Candide*, the *Dictionnaire Philosophique*, histories of Peter the Great, of India, and of Louis XV., the *Treatise on Toleration*, and *Irène*—the last being performed with triumphant success on V.'s return to Paris in 1778. man of brain rather t

er genius—on in many fields and perfection in none. His poems are cold, his metaphysics execrable, his dramas weak in construction, his histories biased and inaccurate; but he excels as a literary craftsman and as a satirist. Although he attacked Christianity, he also attacked the fashionable atheism of his time (e.g. Holbach's): and in his famous cry *Ecrasez l'infâme*, he specifically to anity, but to sion by any

Works. 32 vols. Moland; lives by Hamley (Foreign Classics, 1877), Parton (1881), Morley (1886), and Espinasse (1892).

Voltmeter, an electrical instrument employed for the measurement of currents by means of the amount of decomposition which the current effects in an electrolyte in a given time.

Volterra, an episcopal see of Tuscany, in the prov. of Pisa, Italy. Many valuable Roman and Etruscan reliques are preserved in its museum. The chief manuf. is alabaster. Pop. 14,000.

Volterra, Daniele Ricciarelli da (1509-66), an Italian painter, born at Volterra. Studied under Sodoma and Peruzzi, and assisted Pierino del Vago until 1547, when through the friendship of Michelangelo he was appointed superintendent of the works at the Vatican. His chief works are the 'Descent from the Cross,' 'Massacre of the Innocents,' and 'David slaying Goliath,' on two sides of a slate panel at the Louvre, Paris.

Voltmeter, an instrument for measuring electrical pressure in volts. The instrument is connected to the two points between which the pressure is required, and hence should have a very high resistance so that the introduction of the instrument may not greatly disturb the distribution of the current. Vs. in general use are classified as electro-magnetic and hot

Of the electro-magnetic coil voltmeter of the D'Arsonval galvanometer. It consists of a coil working in jewelled centres and having hair-spring controls. Inside the coil a soft iron cylinder is mounted. The coil and the cylinder are placed between the poles of a permanent horse-shoe magnet, thus ensuring a uniform field of force for the region in which the coil rotates. When a current is sent into the coil, electro-magnetic action takes place and the coil amount of rotation being to the pressure. This

type of instrument can only be used for continuous currents. Another electro-magnetic type of instrument is the *moving magnet voltmeter*. This depends on the fact that a piece of soft iron always tends to move to the strongest parts of a magnetic field. The amount of this motion depends on the strength of the field. If the field is produced by a current, the strength is proportional to the current. For this type of instrument a saturated piece of magnetised soft iron is placed in a field due to a current and the amount of movement is measured. The amount of this

movement is proportional to the intensity of the current. This instrument may be used for direct or alternating currents. In the *hot wire type*, measurement depends upon the elongation of a wire under the influence of heat. One of the effects of an electric current passing through a wire is to heat it, the elongation thus produced affording a means of measuring the pressure. The great defect of Vs. of this variety is that the pointer does not indicate at once the value of the current owing to the fact that the wire takes time to attain its maximum temperature. They may be used for continuous or alternating currents. Another type of instrument is the *electrostatic V.* introduced by Kelvin. In principle it closely resembles the quadrant electrometer. It consists of a pivoted aluminium needle, which can oscillate between two plates which are placed on opposite sides of it. The needle and the fixed plates are connected to the two points between which the pressure is required. This charges the plates and needle to different potentials and thus causes the needle to move, the amount of movement being proportional to the square of the potential difference. The instrument may be used for both continuous and alternating currents. Another important feature is that no current gets through the instrument and thus no power is wasted.

Voltri, a tn. of Genoa prov., Liguria, N. Italy, 9 m. from Genoa, on the Gulf of Genoa. Paper, iron, woollen and cotton goods are manufactured. Shipbuilding is carried on. The Austrians here defeated the French under Masséna (1800). Pop. about 14,820.

Volumenometer, *see* SPECIFIC GRAVITY.

Volumetric Analysis, *see* ANALYSIS, CHEMICAL.

Voluntaryism, the system advocated by those who desire the entire separation of church and state. They would abolish all endowments and state grants for religious purposes, thus making the support of the ministry and all church activities dependent on voluntary contributions.

Volunteers (Naval and Military), the name which was formerly applied to the troops that enlisted voluntarily for service at home. They have since been superseded by a territorial force (q.v.). The old volunteers attended a certain number of drills until they became efficient. The territorial force, however, which consists of a complete army, is a great step in advance of the previous system. The force origin-

ated in the menacing position in which Great Britain found itself in 1859, when patriotic men came forward as volunteers to fill the places of the regular army should that force be called abroad.

Volusenus, Florentius (Florence Wilson or Wolsey), a celebrated Scottish humanist who lived in the first half of the 16th century. He was educated in Aberdeen and at the University of Paris, where he early showed a preference for classical learning. For a time he was tutor to a son of Cardinal Wolsey, and afterwards occupied a scholastic position on the continent. He died in 1546 while on his way to Scotland. His works, which were written in Latin, reflect the beauty of his nature no less than the excellence of his scholarship.

Volute, in architecture, the rolling curves or 'ears' which form the chief beauty and characteristic feature of the capitals of the Ionic order. The name is frequently given to any curve of this kind.

Volvulus, a twisting of the intestine causing occlusion of the passage. It may take place by the gut twisting upon itself or by the formation of a loop. It occurs most often in the sigmoid flexure, and is preceded by a period of constipation. The symptoms are severe localised pain, absolute constipation, and distension of the abdomen. Surgical interference is the only treatment possible.

Vomer, a thin bone situated vertically between the cavities of the nose. It forms the posterior part of the nasal septum.

Vomiting, a reflex act by which the contents of the stomach are violently ejected through the cardiac orifice, up through the œsophagus, and out of the mouth. It is caused by the presence of irritating substances in the stomach, and under such circumstances is a protective effort of the organism. It may, however, be produced by a variety of different causes: by certain drugs; by diseases such as peritonitis, gastric ulcer, constipation, kidney disease, liver disease, consumption, etc.; by certain visual, olfactory, or other sensations; or by reflex nervous stimuli, as in the 'morning sickness' of pregnancy, which originates in the pelvic region. Opium and morphia are useful when the central nervous system is concerned; in cases of stomach irritation, bismuth, ice, carbolio acid, or creosote should be administered.

Vomito Negro, or Black Vomit, occurs when there is hæmorrhage in the stomach due to ulceration; small clots of blood being mixed with the contents ejected.

Vondel, Joost Van Den (1587-1679), a Dutch poet, the son of Anabaptist refugee parents. They returned to Holland, settling in Amsterdam (c. 1600). V. joined the Roman Catholic Church (1640). His dramas (mainly tragedies) include: *Hierusalem Verwoest*, 1620; *Palamedes* . . ., 1625; *Gijsbrecht van Amstel*, 1637; *Lucifer*, 1654 (perhaps used by Milton for *Paradise Lost*); *Samsun*; 1660; and translations from the classics.

Voodooism, a primitive form of fetish-worship supposed to have been brought from Africa into America and the W. Indies by the negro slaves when they were imported. It consists in the worship of a certain serpent, and the terrible nature of the rites has been much exaggerated. The derivation of the name Voodoo is unknown.

Voragine, Jacobus de (c. 1230-92), an Italian author and cleric. He wrote a voluminous history of Genoa, whose archbishop he was for several years; but he is chiefly remembered by his *Legenda Aurea*, better known as *The Golden Legend* (q.v.).

Vorarlberg, the westernmost dist. of Austria-Hungary, forming with Tyrol a prov. of Austria, 11,312 sq. m.

Bav
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Vörde, a vil. of Schwelm circle, Westphalia, Prussia, 8 m. from Barmen. Manufs. include iron and steel goods and wood screws. Pop. about 6600.

Voronezh, a gov. and its cap. in S. Russia. The gov., which has an area of 25,443 sq. m., is watered by the Don and its tributaries, has uplands in the W. and E. of the Don, as well as low, level, and sometimes sandy stretches, and rejoices in a fertile soil, though forest lands are sparse. Besides all kinds of cereals, sunflower, tobacco, aniseed, and beetroot are grown and exported, and there are rich pastures adapted for cattle breeding. Pop. (1911) 3,121,000. The tn. lies on the Voronezh R. 300 m. by rail S.S.E. of Moscow. It is an important centre of commerce on the Don, which brings down wood, tallow, hides, and flax, besides cereals. Pop. (1910) 79,000 (decreasing).

Vörösmartz, Michael, see HUNGARY—Literature.

Vorsterman, Lucas (c. 1595-1675), a Dutch painter. He studied art in Antwerp, where he was influenced by the Earl of Arundel. Subsequently he re-

turned to Flanders, and there did a number of memorable plates for Van Dyck's *Iconography*, 1645. See *Illnd. Short History of Engraving*, 1908.

Vorsterman, Lucas (c. 1628-75), a Flemish engraver. A son of the above named, he lived chiefly at Antwerp, and engraved the illustrations to the Duke of Newcastle's book on horsemanship, 1657; but he is remembered rather by his fine prints in *Théâtre des Peintures de Teniers*, 1660.

Vortex, a term used in hydrodynamics for a motion in a fluid in which the individual particles are conceived as having a circular or rotatory motion. In hydrodynamics a distinction is drawn between such a motion and one in which there is no

of motion in a non-viscous or perfect fluid. He stated that irrotational motion always remains as irrotational motion, and rotational or vortex motion always remains as vortex motion. Thus it is impossible to start or destroy vortex motion in such a liquid. Vortex motion is represented by a straight line vector perpendicular to the plane of rotation, and of length proportional to the vorticity. It can be shown that such a line or filament must start or end in the interior of the fluid, and that a vortex always consists of the same elements of fluid.

Kelvin adopted this idea in his vortex theory of matter, conceiving matter as vortices motion in the all-pervading ether.

Vortigern, a British chief, who after the departure of the Romans became head of the British tribes (c. 425 A.D.). Harassed by the Picts and Scots, he called in the Saxons to his aid and so led to his country's conquest by them.

Vos, Cornelis de (the Elder) (c. 1585-1651), a Flemish painter, pupil of Rembrandt and friend of Van Dyck. His best works were portraits, and he also produced historical pictures. He was Master of the Guild of St. Luke at Antwerp (1608), and dean (1619-20). The Antwerp Museum contains his portrait of Abraham Grapheus (1620).

Vos, Marten (Martin) de (the Elder), (c. 1531-1603), a Flemish painter, son of Pieter (d. c. 1556), pupil of Floris and Tintoretto, painting landscapes in some of the latter's pictures. He went to Rome and Venice, returning to Antwerp (1559), and becoming dean of the Guild of St. Luke (1572). He painted portraits, historical and religious works, and landscapes. Many examples are in Antwerp Museum.

of Arundel. Subsequently he re-

Vosges, a frontier dept. (2303 sq. m. in area) in eastern France, shut in eastward by the V. Mts., the highest French peak being Hohneck (4182 ft.). The Moselle and Meuse have the largest drainage areas. Oats, wheat, and also the vine are cultivated; and cheese-making, besides cattle-grazing, is important. Large forest tracts account for the wood-working industries, but textile goods are the first manuf. Epinal (also the chief town) and St. Dié are two of the five arrondissements. Pop. (1911) 433,914.

Vosges Mountains (Lat. *Vogesus*), are a range of mountains along the W. bank of the Rhine, closely resembling in many respects the Black Forest along the E. They stretch for 150 m. from Basel to Mainz, running between the departments of Vosges and Meurthe in N.E. France and German Lorraine on the one hand, and Alsace on the other. The Ballon de Guebwiller is the culminating point (4680 ft.).

Vosmaer, Carel (1826-88), a Dutch journalist and art-critic, born at the Hague. He commenced his literary career as a poet, but turned to art-criticism, producing masterly studies of Rembrandt (1869) and Franz Hals (1874). Edited the *Nederlandsche Spektator*; published (1873) *Londinias*, a burlesque poem on London, with his own illustrations; translated Homer into Dutch (1878-88); and in 1861 wrote an able work on *Contemporary Artists*. There is no satisfactory life.

Voss, Johann Heinrich (1751-1826), a German poet, translator, and philologist. Invited to Göttingen by the editor Boie (1772); he studied with Heyne for a time, and became a leading member of the 'Hainbund,' a literary society. V. was appointed rector of Ottendorf public school (1778), taught at Eutin (1782), and Jena (1802), and became professor at Heidelberg (1805). His works include *Idylls*, 1802; *Luise*, 1795 (which suggested Goethe's *Hermann und Dorothea*); and excellent translations of the classics, including Homer's *Odyssey*, 1781, and *Iliad*, 1793, Virgil, 1799, Horace, 1806, Theocritus, 1808, and Aristophanes, 1821. His *Sämtliche Werke* were published 1853 (new ed. 1879). See Paulus, *Lebenskunden* . . . 1869; *Briefe* (ed. by his son), 1829-33; Herbst, *J. H. Voss*, 1872-76; Knoegel, *Voss Luise* . . . 1904; *Leben* by Schmid (1835), Döring (1834), Goerres (1826); Sauer, *Der Göttinger Dichterbund*, I., 1887.

Vossius, or Voss, Gerhard Johann (Gerard Jan), (1577-1619), a Dutch scholar, rector of Dordrecht high school (1600), and of the theological school at Leyden (1614), becoming

professor of eloquence there (c.1622). He visited England (1629), and became a prebendary of Canterbury through Laud's influence. On his return to Holland he was made professor of history in Amsterdam University (1631). His works include: *Aristarchus, sive de Arte Dramatica: Historia Pelasgica*, 1618; and *Ars Rhetorica*, 1623. They were published, 1695-1701. See Tollins, *Oratio* . . . 1649; V. André, *Bibl. Belgica*; Toll. *De Vossio perfecto grammatico*, 1778.

Vossius, Isaac (1618-89), a Dutch philologist, son of Gerhard. He travelled in France and Italy, and was in Sweden (1648-58), invited by Queen Christina. V. settled in England (1670), and was made a canon of Windsor by Charles II. (1673). His works include: *De septuaginta interpretibus eorumque translatione et chronologia*, 1661-63; *De Poematum Cantu* . . . 1673; *Variarum Observationum Liber*, 1685; *De Sibyllinis* . . . *Oraculis*; and editions of the classics. See Foppens, *Bibl. Belgica*; Nicéron, *Mémoires*, xiii.; De Cranc, *De Vossiorum Juniorumque familia*, 1820.

Vostitza, also called Aigion, a seaport of Achaia and Elis, in Greece, on the Corinthian Gulf. It has often been injured by earthquakes (1817, 1861, and 1888).

Votkinsk, a tn. in the gov. of Vyatka, Russia, 8 m. W. of Kama. It manufs. vehicles, agricultural implements, and knitted goods.

Vouet, Simon (1590-1649), a French historical painter. He introduced the academic taste into France, and was considered founder of the French school of painting, proving a successful rival of Poussin, who visited France (1640). V. accompanied the French ambassador to Constantinople (1611), and went to Italy (1612), studying the works of Paul Veronese at Venice and of Caravaggio and Guido at Rome. Louis XIII. recalled him to France (1627) as his principal painter, and gave him work in the Luxembourg, Louvre, and St. Germain palaces. Richelieu also employed him at the Château de Rueil. Le Sueur, Le Brun, Mignard, and Dufresnoy were among his pupils.

Vowels, see ALPHABET, PHONETICS.

Voysey, Charles (1828-1912), a founder of the Theistic church, born in London, and took holy orders in the Church of England. He occupied a number of curacies, and his views became increasingly more unorthodox. In 1863 he was compelled to leave St. Mark's, Whitechapel, because he denied the reality of eternal punishment. He passed to Woolwich and then to Healaugh in Yorkshire. On account of his teaching here he was summarily deprived of his living and

founded the church of which he remained the head until his death. Among his works are: *The Sling and the Stone*, 1872-93; *Theism, or Religion of Common Sense*. *Religion for All Mankind*, 1903.

Vratsa (Vratza), the cap. of Vratsa dept., Bulgaria, on the N. slope of the W. Balkans, 40 m. from Sofia. Seat of an archbishop and headquarters of a military division; it produces wine, silk, gold and silver filigree, jewellery, and leather. Pop. about 15,000 (dist. 312,460).

Vrede, the cap. of Vrede div. of Orange Free State (N.E. frontier), S. Africa, about 200 m. from Bloemfontein. Pop. about 500.

Vryburg dist., S. Africa. Founded by the Missionary Society station, and capital of Bechuanaland, which was annexed to the Cape of Good Hope (1895). Pop. about 5130.

Vryheid (Dutch 'freedom'), a tn. of N. Natal, S.E. Africa, 133 m. from Pietermaritzburg. It is the cap. of Vryheid dist.; rich in coal (at Hlobane), copper, gold, and other minerals. Once part of Zululand, it was ceded to the Boers under Meyer, proclaimed an independent 'New Republic' (1884), incorporated with the Transvaal (1888), and annexed to Natal (1903). Pop. about 2200.

Vrynwy, a river (35 m. long), chiefly in Montgomeryshire, Wales. Rising in the Beryn Mts. it reaches the Severn at Melverley after a north-easterly course. Lake Vyrnwy, a reservoir, constructed in 1880 by a dam (1180 ft. long) across the river, which supplies Liverpool with water.

Vukovar, a tn. of Croatia-Slavonia, Hungary, on the Danube, cap. of Szerem (Syrmia) co., 24 m. from Eszek. Chief industries: vine culture, milling, distilling, fisheries, and silk culture. Pop. about 10,000.

Vulcan. In 1859 Leverrier suggested that perturbations of Mercury's orbit unaccounted for were caused by an unknown planet revolving nearer the sun. M. Lessarbault wrote stating that he had observed the transit of such a body that same year. Leverrier was satisfied of the bona fides and apparatus of the observer, and calculated the elements; a transit expected in 1860 did not confirm this. In 1862 Mr. G. B. V. and others, and Mr. Smith, American, during the total eclipse of July 29, 1878, claimed to have found it, but no discovery has resulted from any

observations, and the existence is discredited.

Vulcan, the Roman god of fire, the Greek god Hephaestus. see INDIA-HUBBER—

Vulcanisation.

Vulcano, see LIPARI ISLANDS.

Vulpecular, a small constellation in the Milky Way to the S. of Cygnus, formed by Helvelius. T. Vulpecular is a variable with a period of 4 days, 10½ hrs., its magnitude changing from 5.5 to 6.5. It contains the dumb-bell nebula, Messier 27.

Vulture, a bird with a strong hooked beak, and repulsive in appearance and habits, but of considerable value on account of its food being mainly composed of carrion, which it discovers by its abnormally keen senses of sight and smell. Vs. cannot, like eagles, carry food with their feet and claws, but feed their young by regurgitating from the crop as pigeons do. They are classified in two families, the Vulturidae and the Cathartidae. The former include the griffon V. (*Gyps fulvus*) which occasionally reaches Britain, the black V. (*Vulture monachus*), and the Egyptian V. (*Neophron peronoplerus*). Among the Cathartidae are some birds of great size and powerful flight: examples are the condor (*Sarcorhamphus*), the black V. the Turkey

Vulturinus (modern Vulturino), a riv. in Campania, Italy, near the mouth of which once stood the city of Vulturum. Rising in the Apennines, it flows to the Mediterranean Sea.

Vyatka, a gov. and its cap. in N.E. Russia. The gov., which has an area of 59,329 sq. m., is an undulating plain, some 1000 ft. above the sea. The Kama runs in and out of this province; but it is chiefly drained by the Vyatka and its tributaries, including the Votka and Izh, near which iron ore is found. The high-road to Siberia crosses Vyatka; it is fed by a single railway, namely, that passing from Archangel to Perm. It is above all a corn-growing country, but pony and cattle breeding and wood cutting are thriving industries. Over half the surface is forest, and the peasants own 44 per cent. Factories are increasing in number. Pop (1911) 3,806,800. The tn. lies on the Vyatka, 280 m. N.E. of Nizhni-Novgorod, of which it is a colony. It is a cathedral city. Candles and silver and copper wares are manufactured; commerce is largely in wax, animal products, paper, and corn. Pop. (1911) 44,114.

Vyshnii-Volochok, see VISHNI-VOLATCHOK.

W

W, the twenty-third letter of the English alphabet, sometimes called a 'consonantal u,' capable of performing the functions both of consonant (as in *work, writ*) and vowel (as in *law, few*, and Welsh names like *Bellws-y-Coed* and *Braich-y-pwll*). Probably the Latin *v* or *u* (as consonants) and the Greek digamma *F* resembled our modern *w*. It represents a double *V* (or *U*), *XV*. The Anglo-Saxon alphabet (from 9th century) had a distinct character, *ƿ*, the present mode of writing *W* dating from the 13th century. The French use *ou* as a substitute or *Gu* for proper names (Guillaume for William). The Spanish use mostly *hu* (Huanuco, Hueiva), but sometimes *gu* (Guatemala, Guadiana). Uneducated people substitute *w* for *v* and *vice versa* (weal for real, vine for wine, etc.). See Willis in *Cambr. Phil. Trans.* iii. 231; Koy's *Alphabet*.

Waagen, Gustav Friedrich (1794-1868), a German writer, born at Hamburg. He studied at Breslau and Heidelberg universities, and eventually established his home in Munich. In 1830 he became director of the picture gallery of the museum at Berlin, and in 1844 became a professor at the university in that city. His chief works are: *Ueber Hubert und Johann van Eyck*, 1822; *Kunstwerke und Künstler in England und Paris*, 1837-59; and *Kunstwerke und Künstler in Deutschland*, 1843-45.

Wabash: 1. The cap. of Wabash co., Indiana, U.S.A., about 42 m. S.W. of Fort Wayne, on the Wabash R. It has iron works and railroad shops, and manufs. paper. Pop. (1910) 8687. 2. A trib. of the Ohio R. rising in Ohio, and flowing through Indiana, eventually forming the boundary between Indiana and Illinois. It is navigable as far as Covington, and is connected with Lake Erie by the Wabash and Erie Canal. Length about 550 m.

Wace, Robert, an Anglo-Norman poet of the 12th century. He was the author of a number of lives of saints, but his two most important works are his historical poems, the *Roman de Brut* and the *Roman de Rou*. W. called the former the *Geste des Bretons* ('History of the Britons'), but is now always known as the *Roman de Brut*. It is a reproduction in verse in the French octosyllabic couplet of Geoffrey's *Historia*. The *Roman de Rou* is a chrouleic history of the Dukes of Normandy. W. commenced

it in 1160 at the request of Henry II.; but Henry afterwards appointed another poet to write it, and so W. left his work incomplete.

Wacht am Rhein ('Watch on the Rhine'), a German patriotic song, written when France threatened the l. b. of the Rhine (1840). The words were by Max Schneckenburger (1819-49), and in 1854 were set to music by Carl Wilhelm (1815-75).

Wachter, John George (1673-1757), a German philologist and archaeologist, acquired an exceptional mastery over classical, oriental, and modern languages, a mastery which accounts for the excellence of his *Glossarium Germanicum* (1736-37), which, like his treatise on numismatics, entitled *Archæologia Numaria* (1740) was published at Leipzig, where he was director and librarian of the Museum of Antiquities.

Wachter, Karl Geor von (1797-1880), a German jurist born at Marbach. He became professor at Tübingen (1819-33 and again in 1836) and at Leipzig (1833-36 and again in 1852). He was president of the Chambers (1839-51). Among his publications are: *Lehrbuch des römischen deutschen Strafrechts*, 1825; *Gemeinrecht Deutschlands*, 1844; *Beiträge zur Deutschen Geschichte*, 1845; *Pandekten*, 1880; and *Deutsches Strafrecht*, 1881. See *Life* by his son, 1881.

Waco (so-called from the Waco or Hucco Indians), the cap. of McLennan co., Texas, U.S.A., and lies on the Brazos, 186 m. by rail N.W. of Houston. It is a university city, and has factory products, chiefly from cotton seed. Pop. (1910) 26,425.

Wadai, a state of 150,000 sq. m. in area in the Central Sudan, which, since 1909, has formed part of French Equatorial Africa. The capital is Abeshr, which exports ivory and ostrich feathers. Pop., chiefly Mabas (negroes) and Arabs, about 2,500,000.

Wadding, Luke (1588-1657), an Irish historian, is famous for his *Annales Minorum* (1625-54, 8 vols.) and *Scriptores Ordinis Minorum*, which are still accepted authorities on the Franciscan brotherhood. Himself a Franciscan, he was rector (1625-40) as well as founder of a college for Irish Franciscans in Rome.

Waddington, W. H. (1826-94), a French statesman, born of English parents at St. Remy-sur-l'Avre in France. He naturalised himself as a French subject in 1849. He was a

member of the National Assembly in 1873, and in 1877 he held a position in the cabinet as Minister of Foreign Affairs. For ten years he was the French ambassador in London (1883-93).

Wadebridge, a vil. in Cornwall, England, at the head of the estuary of the Camel, here crossed by a 15th century bridge. Pop. (1911) 2339.

Wadelai, a station, 43 m. N.N.W. of Albert Nyanza on the Upper Nile, in British East Africa. Pop. 1911, 100.

Wädli, a vil. in the canton of Zurich, in Zurich, Switzerland. Pop. 9030.

Wadham College, Oxford, was founded in 1612 by Nicholas Wadham of Merifield, in Somersetshire, for a warden, fifteen fellows, fifteen scholars, two chaplains, and two clerks. It was built upon the site of an ancient house of the Augustinian friars, and from this college the Royal Society had its origin, and held its sittings from 1652-59 in the great room over the gateway. In 1913 the number of members on its books was 422.

Wadhwan, a tn., manufacturing soap, saddlery, and cotton, 60 m. W.S.W. of Ahmadabad, in Kathiawar, Bombay, India. Pop. 16,223.

Wadi, or Wady, an Arabic word signifying a ravine, or a stream. It is also of the Greek names of places, e.g., Wadi-Musa, in Arabia. In Spain, where most of the rivers bear names given by the Arabs, *wad* has been transformed into *quad*, e.g. Wadi-Fabyadh has become Gundalavari.

Wading-birds, see GRALLAE.

Wadstena, see VADSTENA.

Wady Halfa, includes a British camp (founded in 1884), a civil cantonment, and a native village on the Nile, just within the northern frontier of the Anglo-Egyptian Sudan. Pop. of cantonment about 3000.

Wady Musa, the modern name for Petra, which till the 1st century A.D. was the thriving capital of the Nabataeans. It lies some 60 m. N.N.E. of the head of the Gulf of Akabah in Western Arabia.

Wael, or Waal, Cornelius de (1594-1662), a Flemish painter and engraver, the son and pupil of Jan de Wael. His chief patrons being the Duke of Anjou and Philip III. of Spain. He painted battle scenes with great force and

have also the engravings he executed after his 'Market Sellers' and 'Slaves,' etc.

Wafel (Dutch, *waefel*, a cake of wax), a thin cake of flour paste, or more generally, any thin cake or disc. The Ws. used in the Eucharist service of the Roman Catholic Church are thin discs of unleavened bread, stamped with a sacred symbol. Coloured discs of gummed paper are used to designate seals, and are called wafers as being substitutes for the thin cakes of wax which used to perform that office.

Wafflard, Alexis Jacques Marie (1787-1824), a French dramatist, born at Versailles. In collaboration with Beranger he wrote the vaudeville *Les Caméléons*, 1815. He also wrote: *Haydn ou Le Menuet de hérau*, 1812; *Le Voile d'Angleterre ou La Revenduse à la Toilette*, 1814; *Une Promenade à Saint Cloud*, 1817; *Un Moment d'Imprudence*, 1819; *Un Jeu de Bourse*, 1821; *Le Voyage à Dieppe*, 1824.

Wageningen, a tn., 11 m. W. of Arnhem, on the Rhine in Gelderland, Holland. In 1912 the state agricultural college was removed to Grönligen. Pop. 9599.

Wager, Sir Charles (1666-1713), a British admiral, achieved his most noteworthy exploit in 1708, when, with a detachment of four men-of-war, he assailed seventeen Spanish galleons off Cartagena and managed to rescue some of the treasure before it sank to the bottom of the sea. For nine years (1733-42) he was first lord of the admiralty.

Wager of Battle, in ancient times a legal process by which the tenant in a writ of right of land offered to prove his right by challenging, or *relying battle* vicariously through his champion with the latter's

cess, though legally survived till 1818, in which year it was demanded by the nearest relative of a murdered girl against one Abraham Thornton, her supposed seducer and slayer; which remarkable but lawful demand led to its formal abolition by Act of Parliament a year later.

Wager of Law, the name by which the mode of proof by compurgation continued to be employed occasionally in actions for debt until finally abolished in 1833. Compurgation was the alternative to trial by ordeal. It involved bringing a certain number of witnesses called *compurgators* to swear to the good character and credibility of the accused, and the number of compurgators deemed essential to

establish any state of facts depended on the social position of such witnesses; the oath of a thane, for instance, had the weight of that of six ecclesi; but the oath of a priest required no more at all.

Wages, or that labour, or that capital, is given in exchange for labour. The ultimate source of W. as of profits (*q.v.*) is the value of that which capital and labour jointly produce, but in practice W. are paid in the first instance out of capital, which, in itself, is one of the agents of production (see WEALTH). That part of wealth which is expended in W. is commonly called by economists the wages-fund, an expression which is now generally understood to mean no more than that in every industry the wages-capital must be in a certain ratio to the rest of the capital; but, as formulated by Mill, the wages-fund theory regarded general W. as being determined by the 'ratio of capital to population'; a theory which has been the subject of much controversy. Prof. Sidgwick rejects the theory mainly on the ground that it leaves out of account the efficiency of labour, though he admits that Mill himself was careful to point out that the wages-fund was made up mainly of circulating capital, and that, as a theory, it was inadequate to determine the ratio of W. It is clear, as indicated above, that W. cannot be regarded as ultimately paid out of capital; and that the remuneration of labour is really the share of produce that remains after paying for the use of capital and land. Competition as between the employers themselves tends to raise W., as between labourers, to lower them. In this respect, however, it is necessary to take into account the modification of the extreme results of unchecked competition effected by (1) trade unions (see TRADE UNIONS), and (2) Minimum Wage Acts. Under the Coal Mines (Minimum Wage) Act, 1912, district boards are set up to settle the rate of W. in different coal areas, and the effect generally of such Acts as this, and of the Minimum Wage Regulations under the Trade Boards Act, 1909, has been that many workmen or labourers have obtained increased rates. As among different employments the causes that produce different rates of W. are stated by Adam Smith to be (1) The agreeableness or otherwise of the nature of the employment; (2) The difficulty or otherwise, and the expensiveness or cheapness involved in apprenticeship; (3) The constancy of employment; (4) The degree of trust necessarily reposed in the work-

man, and (5) The chances of success in the given trade. (On the influence of protection on wages, see under PROTECTION and TARIFF; and on the connection between W. and prices, see under PRICE.) In 1908-9 W. were depressed, but thereafter began to rise, the most marked increase being in 1912; which upward tendency has been steadily maintained in 1913. Consult on this Mr. F. H. MacLeod's *Report on Changes in Rates of Wages and Hours of Labour in the United Kingdom* for 1912.

Wagga-Wagga, a tn., 266 m. N.E. of Melbourne, on the Murrumbidgee, in Wynyard co., New South Wales, Australia. It is the centre of a sheep-farming and gold-mining district. Pop. 6419.

Wagner, Rudolf (1805-64), a German physiologist, born at Bayreuth. After studying at Paris under Cuvier, he became professor and ultimately professor of zoology and comparative anatomy at Erlangen (1832-40), whence he moved to Göttingen. His publications include *Handwörterbuch der Physiologie* (1842-53) and *Neurologische Untersuchungen* (1853-54).

Wagner, Wilhelm Richard (1813-83), a great German dramatic composer, born at Leipzig. From his earliest childhood he was surrounded by theatrical and musical associations. During his school days at Dresden and Leipzig his favourite studies were the classics, ancient history, and the old tales of mythology which he was afterwards to use to such good purpose. The hearing of one of Beethoven's symphonies fired him with the ambition to become a great composer, and he placed himself under Theodor Weinlig, cantor at the Thomasschule, with whom he studied composition. Mozart and Beethoven were his idols in those days. His first symphony was produced in 1833 at Leipzig, and in the following year he became conductor of the opera at Magdeburg. By that time he had already composed two operas, *Die Feen* (the Fairies) and *Das Liebesverbot* (Love's Interdict). In 1836 he married Wilhelmina Planer, an actress at Königsberg, whither he had gone in search of employment. From Königsberg he went to Riga where he was made musical director at the new theatre. In 1839 he went to Paris with his unfinished opera *Rienzi*, a work which scarcely foreshadows that breaking-away from established traditions which was the most notable feature of his later productions, but which was nevertheless a remarkable achievement for a young man of twenty-six. It was produced with great success at Dresden in 1842, and was followed by *Der Fliegende Höl-*

lander (*The Flying Dutchman*), which did not meet with the same approval, though it has since taken precedence of the earlier work in public favour. Two years later, in 1845, *Tannhäuser* proved a failure, only Schumann

In 1848 he touches the music; but W., who had political agita-

saints. He insisted on the most rigorous observance of the ceremonial law. The influence of the movement is widespread through Arabia, Africa, India, and the Mohammedan East generally, and it has led to many fanatical revolts.

Wahsatch Mountains, a long range running N. and S. through the centre of Utah, U.S.A. They form the eastern margin of the Great Basin and contain at least four peaks over 11,000 ft. high. The loftiest is Timpanogos Peak (11,957 ft.).

Wai, a sacred city of the Hindus, the resort of multitudes of pilgrims, on the Kistna, in Satara, Bombay, India. Pop. 14,000.

Waiblingen, a tn. with manufs. of silk goods, and potteries, 9 m. N.E. of Stuttgart, in Württemberg, Germany. It is the centre of a vine-growing district. Pop. 6977.

Waits, goods found, the ownership of which is unknown. Originally applied exclusively to goods abandoned by a thief to avoid arrest. Such goods were forfeited to the king or lord of the manor having the franchise (q.v.) of the W., the idea being to confiscate the property by way of punishing the true owner for not prosecuting the thief; consequently if the owner made fresh pursuit and brought him to justice within a year and a day the W. was restored to him. But the goods of foreign merchants were not Ws., as they were not supposed to know English law.

Waikato, the chief river (200 m. long) of North Island, New Zealand. Rising to the S. of Lake Taupo, which it drains; it flows N.N.W. and finally W. to Port Waikato on the W. coast, where it enters the Pacific.

Wainwright, Thomas Griffiths (1794-1852), an English journalist, artist, and poisoner, born at Chiswick. He was brought up by his grandfather, Dr. Ralph Griffiths (1720-1803), founder of the *Monthly Review*. Entering on a journalistic career, he contributed to *Blackwood's*, the *London Magazine*, under the pseudonym of James Weathercock, etc., and became a friend of Charles Lamb. He also exhibited in the Royal Academy (1821-25) and wrote art-criticisms. To procure money to pay debts, he poisoned his sister-in-law, mother-in-law, uncle, and a friend, and in 1837 was arrested on a charge of forgery and transported for life.

Waits were originally night watchmen who carried musical instruments. The term, however, came to

tion of the time, was forced to quit Saxony. He escaped to Zürich, where he remained till 1859. *Der Ring des Nibelungen*, his great tetralogy, was begun before he left Dresden, but ere he completed it he turned aside to write *Tristan und Isolde*. In 1861 he received a pardon and returned to Germany. *Tristan* was produced in 1865, and *Die Meistersinger*, a comic opera, in 1868. His first wife having died in 1865, W. married Cosima, daughter of Liszt, in 1870. His ideas were adopted by Ludwig, King of Bavaria, who invited him to Munich to complete the *Ring*, and advanced his schemes in every possible way. Six years later the entire *Ring* was performed at Bayreuth, in a building specially erected for the purpose. His last work, *Parsifal*, was a drama founded on the story of the Holy Grail. W. died of heart failure and was buried in his house.

W. has ever been the subject of more discussion than W., none has been more hotly attacked or more hotly defended. He was, in trite phrase, a 'man with a mission,' the Carlyle of music and the drama, whose passionate love of truth and beauty, and zealous enthusiasm for the reform of art, led him sometimes into strange paths, where he was with difficulty followed during his lifetime. See his autobiography, *My Life*, 1911; and *Life by Charles A. Lidey* (Master Musician Series); H. S. Chamberlain (Eng. trans. by G. Ainslie Hight); Ernest Newman, 1913; Professor F. Corlier; and G. B. Shaw's *Perfect Wagnerite*.

Wagram, a vill. near Vienna, Austria. Historically it is important as being the site of the battle of Wagram (July, 1809), in which Napoleon defeated the Austrians under the Archduke Charles.

Wahai Mohai (1787). The movement which he started was essentially a reforming one and aimed at re-establishing the Koran as the sole rule of faith. While disavowing tradition, he also endeavoured to abolish popular religious ceremonies and the excessive veneration of the prophet and the

be applied to musicians who had no watch duties, and now signifies the bands of street musicians who play at Christmas time. They date from very early times; in Exeter from 1400.

Waltz, Georg (1813-86), a German historian, born at Flensburg, Schleswig, and educated at Kiel and Berlin. He was for a short time a member of the national parliament at Frankfurt, and was a keen supporter of the proposed union of the German states into one empire. His national zeal was further demonstrated by his founding of a school to study mediæval German literature.

Waltz, Theodor (1821-64), a German philosopher, was professor at the University of Marburg. Psychology was the subject to which he gave most of his attention. He also undertook researches lasting over a number of years into the question of the habits and anthropological origins of various uncivilised races, the result of which he embodied in his work *Anthropologie der Naturvölker* (1859-65).

Waitzen, the German name for Vaz (q.v.).

Waiver, in law, the abstaining voluntarily from availing oneself of a right or claim. Formerly also applied to the legal process by which a woman was waived or put out of the protection of the law for any crime for which a man might be outlawed. Commercially W. denotes the oral or written discharge by the holder of a bill of exchange of any party from his liability on the instrument.

Wakamatsu, a tn. of Honshiu, Japan, 60 m. S.E. of Nūgata, and chiefly engaged in the manuf. of lacquer ware. Pop. 40,000.

Wakayama, a seaport tn. on the mainland of Japan, about 50 m. S.W. of Osaka. The chief article of trade is cotton. Pop. 77,303.

Wake (Old Eng. *wacu*, a watch); or Lych-wake (Old Eng. *lyc*, a body), an ancient observance by which the body of a dead person was watched all night by friends and relatives. Ws. were also observed on the eves of saints' days. These all-night vigils were the cause of revelry and disorder, and so came into bad odour, and have now entirely died out.

Wake, William, D.D. (1657-1737), an archbishop of Canterbury, was educated at Oxford. He made great efforts to unite the English and French churches, while among his literary works are: *The Principles of the Christian Religion Explained in a Brief Commentary on the Church Catechism*, 1699, and *Sermons*.

Wakefield: 1. A parl. bor. in the W. Riding of Yorkshire, has been

the seat of a bishop since 1888, when All Saints was made the cathedral. Many stirring events in English history have occurred here, for instance, the battle of Wakefield in 1460. The soil around is rich and productive, and the town has a handsome and commodious corn exchange. There are also extensive woollen and hosiery manufs. W. is well situated on a gentle slope rising from the R. Calder. Pop. (1911) 51,511. 2. A township of Middlesex co., Massachusetts, U.S.A., including several manufacturing villages. It was originally part of Reading. Pop. (1910) 11,404.

Wakefield, Gilbert (1756-1801), a controversial writer and critic, born at Nottingham, and became a curate in Liverpool; but being unable to accept the doctrines of the church of England entered as a tutor, first at Warrington Academy and afterwards at Hackney Unitarian College. In 1799 he was confined in Dorchester Gaol on account of a denunciatory letter written to the bishop of Llandaff, but was released in 1801. He has written many tracts, but his best works are: *Silva Critica*, 1789-95, and an edition of *Lucretius*, 1796.

Wakefield Mystery, see TOWNELEY MYSTERIES.

Wake-Robin, another name for cuckoo-pint. See ARUM.

Wakkerstroom, or Wesselstroom, the cap. of the dist. of Wakkerstroom, S. Africa, trades chiefly in wool, skins, and butter.

Wakley, Thomas, founder of the *Lancet* (q.v.).

Walajapet, a tn. in the Arcot div., Madras, India, about 19 m. E. of Vellore. The chief occupation of the people is dyeing and silk-weaving. Pop. about 10,000.

Walata, a tn. and oasis in the Sahara, situated about 255 m. W.N.W. of Timbuktu.

Walcheren, an island in the prov. of Zeeland, Holland, situated between the E. and W. Scheldt. The chief towns are Middelburg and Flushing.

Walcheren Expedition, The (1809), an attempt made by Britain during the Napoleonic War to seize Antwerp and the Scheldt. Chatham commanded the land forces and Sir R. Strachan the naval forces. The only achievement was the landing of the soldiers on the Island of Walcheren, where thousands died of fever.

Walckenaer, - Charles Athanasie, Baron (1771-1852), a French scholar and geographer, served first in the army. His chief works are: *Essai sur l'Histoire de l'Espèce Humaine*, 1798; *Faune Parisienne: Insectes*, 1802; *Œuvres de la Fontaine*, 1822; *Lettres sur les Contes des Fées*, 1826.

Wald: 1. A tn. in the district of Düsseldorf, Rhenish Prussia, 7 m. S.W. of Elberfeld. Chief manufs. iron and steel. Pop. 25,311. 2. A vil. in the canton of Zürich, Switzerland. Pop. 7318.

Waldeck, or Waldeck-Pyrmont, a principality of Germany and a state of the empire, consisting of W. enclosed by the Prussian provinces of Westphalia and Hesse-Nassau, and bounded on the north by Hanover, on the east by the Grand Duchy of Hesse, and on the south by the Grand Duchy of Hesse. Both are watered by the Eder, Diemel, and Emmer. The surface is hilly and about one-third is covered with forest. Agriculture and cattle-rearing are the chief industries, and iron mines, slate and stone quarries are worked at various points, which, with timber, wool, poultry, and live stock, form the chief exports. The chief town is Arolsen. Area 433 sq. m. Pop. 61,723.

Waldeck-Rousseau, Pierre-Marie-René (1846-1904), a French lawyer

and statesman, born at Nantes, son of an attorney and regarded in his personal life as the death of

Gambetta. He studied law at Rennes. Became mayor of Nantes (1870). In 1879 entered politics as a deputy for Rennes, retaining his membership for that division for nearly ten years. He attached himself to the Republican party, and throughout his career fought strenuously against the reactionary tendencies of the government. In 1891 he became a member of the Chamber of Deputies. He was the remark of Gambetta.

latter he retained that office under Jules Ferry. In 1886 he attached himself to the Paris bar, and at once established himself in a leading position. Though still deputy for Rennes, he did not take an active part in politics again until 1887, when he became senator for the department of the Loire. In the Boulanger controversy he displayed his wonted vigour, but earned the animosity of

the majority. But it was his refusal to disintegrate the French Republic into such a cabinet, and in this, in spite of his obvious reluctance, he eventually succeeded, ranging in his cabinet many notabilities of diverse opinions whose one bond of union was, nevertheless, the principle resolve to re-

sist the reactionary policy of the Nationalists and the religious orders.

Waldemar I. (1131-82), King of Denmark, surnamed the Great. Was the posthumous son of Canute Lavard. His childhood and youth were periods of great danger to him, and after becoming a candidate for the Danish throne he narrowly escaped assassination. He became sole king in 1157, and together with Absalon ruled the country firmly and well.

Waldemar II. (1170-1241), King of Denmark, succeeded his brother, Canute VI., in 1202. He had already shown himself a determined upholder of Danish independence. He obtained possession of Lübeck and two other equally important bishoprics, and by treaty and friendship with Frederik II., the emperor, he obtained all the Wend lands and the lands of N. Germany. He also directed his attention towards Esthonia, Livonia, and Prussia, and

Denmark, born at a period when the fortunes of Denmark were at their lowest ebb. W. was elected king at the age of 20. His aim was to obtain possession of those territories which had formerly belonged to the Danish crown and which were now scattered. By 1300 practically all the old Danish lands including Scania were in his hands. He had, however, raised up many enemies who now persistently attacked him.

Waldenburg, a tn. in Silesia, Prussia, 43 m. S.W. of Breslau. The chief manufs. are porcelain, firebricks, and glassware. Pop. 16,133.

Waldenses, or Vaudois, a remarkable people, who form a communion separate from the Church of Rome, and who live in three high valleys of Piedmont. This little community is remarkable for having kept itself from time immemorial separate from the Church of Rome. The W. have always rejected any distinctive sectarian appellation, and have boasted of adhering from age to age to the primitive faith. The persecutions of the W. fill up a large portion of their history.

Waldheim, a tn. of Saxony, situated 33 m. S.E. of Leipzig; engaged in the manuf. of cloth and cigars. Pop. 12,353.

Waldkirch, a tn. in the valley of the Black Forest, Baden, 84 m. S.E. of Freiburg; engaged in the manuf. of cotton and woollen goods. Pop. 5428.

Waldsassen, a market tn. in the Upper Palatinate, Bavaria, 33 m. E.N.E. of Bayreuth; having iron mines. Pop. 5041.

Waldseemüller (or Waltzemüller), Martin (1470-1513), a German geographer, who styled himself Hylacomylus, born at Freiburg, and became professor of geography at St. Dié (1504). His fame now chiefly rests on his having suggested in his *Cosmographia Introductio* (1507) that the New World should be called America, after Amerigo Vespucci.

Wales. See ENGLAND AND WALES.

History.—The aboriginal inhabitants of Britain belonged to an obscure non-Aryan race; but these were in the 6th or 7th century B.C. conquered and assimilated by the Goidelic Celts, the direct ancestors of the modern Welsh. The Celts attained a considerable degree of civilisation under Roman rule, and accepted Christianity in about A.D. 200, and they maintained this faith when the rest of the island was re-paganised. On the conquest of Britain by the Saxons (c. 450-600) the Celts were driven back into the western corners of the island—Cumberland, W., and Cornwall. Henceforth W. became the main stronghold of the Celts or Britons. Powerful native princes arose in W., and extended and consolidated their dominions. Among the most notable of these were Cadwallon the Long-Handed and his son Maolwyn Gwynedd. The Welsh people were for a time united under the latter's grandson, also named Cadwallon. About this period monasticism made great progress in Wales, and the country began to be organised on tribal lines. The Britons of W. made for some centuries repeated attempts to recover the N. parts of England from the Saxons; but these attempts ceased after 664, and there follows a period of internal strife and Saxon aggression, W. being again divided among a number of petty princes. The country was once again united under Rhodri the Great (814-77), who successfully resisted the onslaughts of the Danes, but was himself defeated and slain by the Mercians. On his death his dominions were again divided. The next important Welsh prince was Howel Dda or Howel the Good (909-50), who made himself master of the greater part of W., but did homage to King Atholstan of England. He also collected and codified an elaborate system of laws by which the people were divided into the royal class, the free tribesmen, and the non-tribesmen. From 950-1010 no supreme king ruled in W., but there were constant struggles between various petty local princes, as well as many raids on the part of Danes and Saxons. This period of anarchy was followed by the rule of two strong

princes, Llywelyn ab Seisyllt and his son Griffith. Llywelyn did much to reunite his country, which he completely freed from Danish raids. Griffith (1039-63) was a monarch of great energy. He expelled the Saxons from Gwynedd, conquered S. Wales, consolidated his dominions, and made war against England, which he three times invaded. Eventually Harold of England subdued S. Wales and defeated Griffith, who was slain by treachery (1063). The Norman conquest of England (1066) had at first little immediate effect upon Wales, distracted as she was by civil feuds. But it was not long before the Norman kings began to make encroachments, in particular placing on the Welsh borders a number of powerful barons who took advantage of the disorganised state of W. to expand their territories. The next two centuries (roughly, 1066-1282) form an epoch of continual struggle against Norman aggression. There were perpetual revolts on the part of Welsh princes and chieftains, and in 1094 there was a brief and transient Welsh revival, led by Cadwgan ab Bleddyn, who united the Welsh people against the Normans. He met with considerable success for a time, but could not for long stem the torrent of Anglo-Norman aggrandisement. At length Henry I. made a determined effort to anglicise W., which he attacked simultaneously with three armies, reducing most of the Welsh princes to submission. They recovered much of their lost ground, however, during the civil wars of Stephen's reign. His successor, Henry II., determined at once to curb the power of the border barons and to subjugate the Welsh princes. He succeeded in establishing some semblance of order, largely through the instrumentality of Rhys ab Griffith (1132-97), a distinguished warrior and statesman, who became his ally and vassal, constantly attended his councils, and was made by him justiciar of S. Wales. Meanwhile, before the end of the 12th century, the Welsh Church had been merged completely in the Church of England, and had lost all independence in internal affairs, Welsh bishops being consecrated by English archbishops who claimed their allegiance. A formidable stand was made for independence in ecclesiastical matters by the celebrated Giraldus Cambrensis (1147-1223), but without ultimate success. The most important Welsh prince of the early 13th century was Llywelyn Fawr (fl. 1194-1240), whose policy included the alliance of all the Welsh princes under his own leadership, the maintenance of friendship with the border families, and the

acknowledgment of vassalage to the King of England. But Llywelyn's dream of unity and concord died with him, and the dependence on England was in the highest degree distasteful to his immediate successors, of whom the most notable was David (1240-46), who for some time successfully resisted the aggressions of Henry III. The final struggle for independence was inspired and led by the famous Llywelyn ab Griffith (1254-82), who was goaded into revolt by the violence of the English king's agents and by the substitution of English law for Welsh custom. He refused to take the oath of fealty or do homage to Edward I., who in consequence invaded W. (1277) and compelled Llywelyn to submit to the humiliating terms of the Treaty of Conway. He accordingly did homage to Edward at Westminster in 1278, but a few years later again broke out into revolt, being exasperated by the establishment of new institutions and the exactions of the English officials. Edward once again invaded W. and completely over-ran the country; Llywelyn was defeated and slain (1282), and his brother David was hanged and quartered. From this moment Wales ceases to have any separate political existence. The most formidable rising against the new order was the great national movement associated with the name of Owon Glyndwr (fl. 1400-15), the celebrated warrior and statesman. The principal results of these risings and of the havoc wrought by the Wars of the Roses were the complete destruction of the feudal system, the enormous prevalence of robbers, the appropriation by Englishmen of all positions of trust, the enactment of many severe and unjust laws against the Welsh, and the growth of bitter racial

either the Reformation or the Puritan movement; it was not till the beginning of the Methodist revival in about 1730 that the country experienced a real religious awakening. The ferment of the Methodist movement spread over W. with lightning rapidity and has hardly to this day lost its force. The religious revival led indirectly to a great though gradual national awakening which has since borne diverse and abundant fruit in the social, literary, and industrial revival now in full progress. During the past century W. has gained enormously both in national prosperity and intellectual fruitfulness; and in recent days she has contributed to the service of the empire a large number of illustrious citizens and statesmen, among whom it will suffice to record the names of Lord Aberdare, Sir Hugh Owen, Mr. Tom Ellis, and Mr. David Lloyd George.

Welsh language and literature.—

Two causes have kept the Welsh language alive up to the present day, the isolation of the people among the mountains, and religion. The Snowdonian region (Eryri) has never been conquered by England, nor has there been any incentive for any other people save the Welsh to take possession of the Carnarvonshire mountains. There the Welsh language has been spoken since the dawn of British history. Up to the Tudor period it was spoken by the upper and the lower classes, and while all the princes were patrons of Welsh poets, there are at least two of the old princes themselves who wrote mediæval verse of some worth. The Welsh language might have died soon, but for the efforts of men like John Penri, who in Elizabeth's reign gave his life for his language, with the result that the Bible was translated into Welsh in 1562. That saved the native tongue

some generations, but by the 17th century it was clearly becoming corrupt, and but for the Methodist revival of that time would probably by this day be lying with its brothers the Gaelic and Erse among the dead languages. The revival was conducted in Welsh, and gave birth to an educational system whose

not even yet come up in the wake of the Bible was sold

for a few pence, and the language was saved. Now Welsh is taught in the elementary and secondary schools, and its study forms one of the most popular branches at the Welsh University colleges. The publication of the first part of Professor John Morris Jones' *Welsh Grammar* in June 1913, will be looked upon as an epoch in the progress of the new national spirit

Nevertheless, this period of oppression corresponds in point of time with the golden age of Welsh poetry. At length, in 1536, the Act of Union was passed by which W. was politically assimilated in all respects to England. The liberties as well as the laws of England extended to the Principality, and was now for the first time given

liamentary representation. On the other hand, the Welsh language was

banished from the customs time the begins to d to par-

take in the various activities of England. In matters of religion W. was not at first very greatly affected by

of W. The desire of the modern scholars is to bring uniformity into the spelling, to re-introduce some of the strong and beautiful words of mediæval Welsh, to abolish the Latinisms introduced by the scholarly translators of the Bible, and to revert to the standard of pure Welsh prose as it was written by Elis Wyn in his *Bardd Cwsg* of 1703. Their efforts are meeting with success, and the vernacular press has made a distinct advance in the purity of its vocabulary and in the use of indigenous idioms in the course of the years 1909-13. The *Brython* newspaper has taken the lead in this popular movement. Their are eight outstanding names in the roll of Welsh letters: four poets, Dafydd ap Gwilym, Goronwy Owen, Islwyn, and Ceiriog; and four prose writers, the author of the *Mabinogion*, Elis Wyn, Theophilus Evans, and Morgan Llwyd. Dafydd ap Gwilym lived in the 14th century, and as a pure poet in the style of Keats, he is probably the best poet of W. He wrote many *Cynwyddau* or lyrical odes, in which Nature is painted with brilliant touches, and have gained for him the title of The Poet of the Leaves. Dafydd was a troubadour, and ranks close to Vogelweide and Ventadorn in European literature. Goronwy Owen was a purist of the 18th century. He had a high conception of poetry, was not a 'popular' poet, and wrote a classic ode *To the Judgment Day*. He is now studied in the schools. Islwyn is a 19th century blank verse writer, who, though he had very little conception of his art, wrote passages of great vigour and fervour. His influence was strong on the eisteddfod poetry of the 'nineties. Ceiriog is the people's poet of the time of Islwyn. His muse was lyrical, and his songs are to W. what those of Burns are to Scotland. The *Mabinogion* are of European reputation, and hold an important place in the story of the Arthurian legend. The quality of the style of the *Mabinogion* has been justly praised by Matthew Arnold, while Lady Charlotte Guest has done them much justice in her beautiful English translation. Elis Wyn is the best writer of Welsh prose, and though his master-book, *The Sleeping Bard*, is borrowed in idea from the Spanish of Quevedo, it is, nevertheless, so native in its colour, speech, and idiom that it is set to-day as the model for all generations to copy. The 15th century divides this literature into two. The early period begins with the war poetry of the 5th and 6th centuries, among which the *Gododdin* is supreme as an early epic song. Then follows the court poets of the Norman period, chief of whom is Prince Howell, whose long lyric of W.

and nature and love is strangely modern in its artistry and places him high in the list of poets. At this time the *Mabinogion* were recited and written down. The period culminates in Dafydd ap Gwilym. In the 15th century the nobility leave the peasants to their own devices, and Welsh song is heard only in the woods and on the roadside. This leads to the popular song of the 16th century as shown in Vicar Pritchard's use of it to help on religion, which develops in the first part of the 18th century into the perfected hymn of *Pantycelyn*. Then follows the day of the Eisteddfod culminating in Islwyn and Ceiriog. Letters play a great share in the modern national revival, and in the persons of Professor Morris Jones, Gwynn Jones, W. J. Gruffydd, and Robert Parry, the muse once more is appearing with the freshness she showed in Ap Gwilym. The year 1913 is marked by a striking development in Welsh drama, over a hundred companies performing in the villages.

Wales, Calvinistic Methodist Church in, is Calvinistic in its doctrine and Presbyterian in its organisation. It is modern in its origin, and owes its beginnings chiefly to the preaching of Howell Harris and others from 1735 onwards. Later, George Whitefield came into touch with them and aided them in their work. The connection, however, between the English and Welsh Methodists, ceased before 1750. Its first General Synod was held in 1811. The body has two training colleges (at Bala and Trevecca), and number some 16,500 members.

Wales, Edward Albert Christian George Andrew Patrick David, Prince of (b. 1894), heir-apparent to the crown, born at White Lodge, Sheen. He was created Prince of Wales on his sixteenth birthday, and, before attaining his majority, in 1912 he had completed his naval education at Osborne and Dartmouth, being gazetted midshipman in 1911. He went into residence as a commoner of Magdalen, Oxford, in Oct. 1912. He also holds the titles of Earl of Chester (1910), Duke of Cornwall, Earl of Carrick, Baron of Renfrew, Lord of the Isles, Grand Steward or Seneschal of Scotland, Duke of Saxony, and Prince of Saxe-Coburg and Gotha, and is a Knight of the Garter (created 1911).

Wales, New South, see NEW SOUTH WALES.

Wales, Prince of. The eldest son of the King of England, becomes at birth Duke of Cornwall, and on succeeding to the throne the duchy vests in his eldest son; but the king

can, if and when he chooses, create his son P. of W. and Earl of Chester by letters patent. It is now customary always to make the heir apparent to the throne P. of W., but the title is not heritable. The life of the P. of W. and the chastity of his wife are protected by the Statute of Treasons (see TREASON). Provision is made for the Prince and Princess of Wales by the Civil List Act, 1901. Apart from restrictions as to his marriage and his protection by the law of treason, the status of the P. of W. is to a great extent that of an ordinary subject. e.g. he may sue and be sued in the ordinary manner, though in such case he is always represented by the Attorney-General of the Duchy of Cornwall. The custody and education of the P. of W. are in the control of the reigning sovereign.

Wales, University of, was founded in 1893 from a union of the colleges of Aberystwith, Bangor, and Cardiff. These three still remain the constituent colleges of the university, none taking precedence of the others. There are associated theological colleges at Bala, Brecon, Aberystwith, Carmarthen, Cardiff, and Bangor. The university grants degrees in arts, medicine, law, music, and science.

Wales, William (1734-98), an English mathematician and astronomer, was sent, about 1770, to Hudson's Bay to observe the transit of Venus. One of his chief works is *Astronomical Observations made on the Voyages for making Discoveries in the Southern Hemisphere*, 1788.

Walfish Bay (Walvisch, or Walwich), a bay on the W. coast of Africa and a div. belonging to Great Britain and forming part of Cape of Good Hope. It consists of a stretch of sand and a small peninsula, the area being about 430 sq. m. Pop. 1000.

Walgett, a tn. in the co. of Baradine, New South Wales, on the Namoi R., about 330 m. N.N.W. of Sydney. Pop. 3000.

Walhalla, a tn. in Victoria, Australia, 85 m. E.S.E. of Melbourne. Pop. 3000.

Walhalla, see VALHALLA.

Walker, a tn. in the co. of Northumberland, England, 3 m. E. of Newcastle, on the R. Tyne. Manufs. chemicals and has iron foundries and shipbuilding. Pop. (1911) 13,500.

Walker, Clement (d. 1651), a Presbyterian leader, born at Cliffe in Dorset. He became a student of the Middle Temple in 1611, and on the outbreak of the Civil War chose the parliamentary side. In 1640 he was elected member for Wells and vigorously opposed the independents, and

in 1647 published his *Mystery of the Two Junos* against parliamentary misrule. He was prisoner in the Tower of London (1649) till his death on account of his *History of Independency*, part i., 1648; part ii., 1649; part iii., 1651.

Walker, Francis Amasa (1810-97), an American soldier and political economist, born in Boston, Massachusetts. He became secretary of state for Massachusetts (1851-53); representative of Congress (1862-63); professor of political economy at Yale (1873-81), and president of the Massachusetts Institute of Technology. His *Wages Quest*

Land and its

Bimetallism, 1896, etc.

Walker, Frederick (1840-75), an English painter, born in London, studied there at the British Museum, National Gallery, and elsewhere. About 1858 he took up engraving and apprenticed himself to Whimper. From this he became known as an illustrator. He illustrated some of Thackeray's work.

Walker, John (1674-1747), an ecclesiastical historian, born in Exeter and became rector of St. Mary Major, Exeter, in 1698. He published *An Attempt towards Recovering an Account of the Church*

an Ox-
t. Win-
ze. He
age and
in 1819.
Curious
Maga-

zine; *Oxoniana; Letters written by Eminent Persons; Curia Oxoniensis*.

Walker, John (c. 1781-1859), the inventor of lucifer matches, born at Stookton-on-Tees. He was at first articled to a surgeon, but, disliking the work, took up the study of chemistry, and set up in business in 1818. He was especially interested in searching for a means of obtaining fire easily, and after various experiments, invented the friction match (1827).

Walker, Thomas (1784-1836), a magistrate and author, educated at Trinity College, Cambridge. He published a journal called *The Original*, in which he wrote during its brief existence of six months. Among his works are *The Art of Dining*, 1837.

(1821-60), an
born at Nash-
studied medi-
on drifted into
journalism in New Orleans and San Francisco, and practised as a barrister.

ter in California. W.'s first military exploit occurred in 1853 when he got together an expedition whose object was to capture the state of Sonora in Mexico. He proclaimed himself president of the Pacific Republic, but after a while he was compelled to surrender to the U.S. military authorities. His next adventure was with the Nicaraguans. His interference in Nicaraguan politics involved him in trouble with Costa Rica. One or two inconclusive battles were fought, but W. remained in supreme authority in Nicaragua. As the result of various insurrections against his rule, W. was deposed from his presidency and taken to New Orleans by the U.S. authorities. After several other intrigues and episodes with various S. American states, he was tried by court-martial and shot in Honduras.

Walker, William Sidney (1795-1846), a Shakespearean critic, was a native of Pembroke. He wrote *Shakespeare's Versification* (1852) and a *Critical Examination of the Text of Shakespeare, with Remarks on his Language and that of his Contemporaries, together with Notes on his Plays and Poems*, 1857. See his *Poetical Remains* (1852) with memoir by Moultrie.

Walkerburn, a vil. in Peeblesshire, Scotland, on the Tweed, engaged in the woollen manufacture. Pop. (1911) 1100.

Walking, see ATHLETICS.

Walking-sticks. The habit of using a stick either for support, or show, is of great antiquity, and in modern times the preparation and supply of W. constitutes a large branch of trade in European countries. In 1878 the term W. was applied to candidates in the House of Commons, who were nominated by political associations.

Walkyries, see VALKYRIES.

Wall, Great, of China, see CHINA.

Wallaby, see KANGAROO.

W.

Weyor, but was keenly interested in botany. He became a schoolmaster in a private school in Leicester, and made the acquaintance of H. W. Bates. In 1848 the two friends set out for the Amazon, but separated later. A large part of his collection was burnt with the ship in which he was returning. From 1854 to 1862 W. was in the Malay Archipelago; here he established the 'Wallace Line,' zoologically separating Lombok and Celebes from Bali and Borneo. His own work and the reading of Malthus' *Essay on Population* led him to the idea of the 'survival of the fittest,' as a correlation of natural selection, and

his own formulation of the law that every species originates at the same time and in the same locality as a pre-existing closely allied species. He wrote immediately to Darwin, who received the letter on June 18, 1858. Darwin noted the extraordinary coincidence of views, and communicated with Sir C. Lyell and Sir Joseph Hooker the same day. As a result a joint paper was read, containing Darwin's views, to the Linnean Society on July 1, 1858. W.'s *Contributions to the Theory of Natural Selection* appeared in 1871, and contained his views on the whole question of evolution, differing in certain aspects from Darwin. These points are clearly set forth in *Darwinism*, published in 1889. In particular he insists on a 'spiritual' influence in man's development, marking clearly a departure from the realm of pure science. This tendency was exaggerated to a regrettable extent in his excursions into spiritualistic circles, an account of which forms a very disproportionate amount of *My Life* (new ed. 1908). In 1887 he made a tour of the States and Canada, delivering six Lowell lectures in Boston. During the latter part of his life he was keenly interested in the social problems of his times, expressing his views with forcible advocacy in several books. The Royal Medal in 1868 and the first Darwin Medal, 1890, were presented to him by the Royal Society. He was president of the Entomological Society in 1870-71. In 1889 he received the degree of D.C.L. from Oxford University. In 1881 he received a pension at the hands of Mr. Gladstone. Among his other writings are: *Travels on the Amazon*, 1853; *The Malay Archipelago*, 1869; *Island Life*, 1880; *Geographical Distribution of Animals*, 1876; *Miracles and Modern Spiritualism*, 1881; *Land Nationalisation*, 1882; *Forty-five Years of Registration*, 1885; *The Wonderful Century* (new ed.), 1903; *Man's Place in the Universe* (new ed.), 1904; *Is Mars Habitable?* 1907; *The Retort of Democracy*, 1913; *Social Environment and Moral Progress*, 1912.

Wallace, Lewis (Lew) (1827-1905), an American soldier and writer, born at Brookville, Indiana. He fought in the Mexican War (1846-47) and as a federalist in the Civil War (1862-64), taking part in the capture of Fort Donelson (1862). He was appointed governor of New Mexico Territory (1878-81) and ambassador to Turkey (1881-85). His novels include *Ben Hur*, 1880, which achieved a great success; *The Prince of India*, 1893, and *The Wooing of Malkatoon*, 1898.

Wallace, Sir Richard (1818-90), an English art connoisseur, born in

London, the natural son of the Marchioness of Hertford. He was educated in Paris, where he gathered together a valuable collection, & in 1857. He then helped the Marquis of Hertford, his half-brother, in forming his collection, which he inherited in 1876, and which was bequeathed by his widow to the British nation in 1897.

Wallace, Robert (1831-99), a Scottish theologian and politician, born near Cupar, Fife. In 1872 he became professor of church history at the university there, and on leaving the ministry was editor of the *Scotsman* (1876-80). He represented E. Edinburgh in parliament (1886-99) and was strongly opposed to the Home Rule Bill. See Smith and Wallace, *Life and Last Leaves*, 1903.

Wallace, Sir William (c. 1272-1305), a Scottish patriot, born probably at Elderslie, near Paisley. He came of a family whose members were enemies of England; he first took up arms against the English in 1297. It was an opportune moment for a Scottish rising. Edward I. had taken advantage of the dispute as to the succession to the Scottish throne to possess himself of the country. In 1296 he ravaged the country and made prisoner John de Baliol, at the time the occupant of the Scottish throne. John de Warenne was appointed guardian of Scotland, and English sheriffs were set up in the southern shires and in Ayr and Lanark. In 1297 the English barons and clergy were in revolt against Edward I., while he was absorbed in preparations for the French war. Thus W. seized his opportunity, he organised the Scottish insurgents in the name of John de Baliol, killed Sir William Heselrig, the English sheriff of Lanark, and became joint warden of Scotland. He next drove the English out of Perth, Stirling, and Lanark shires, besieged and Stirling castles, and defeated the English at Stirling Bridge. This was the work of 1297, but ravaging Northumberland, Morland, and Cumberland, he was defeated by Edward I. (1298) and resigned the throne of Scotland. After this he fled to France and sought refuge in Norway, France, and the being refused, returned to Scotland, and carried on a guerrilla warfare (1303-5). He was declared an outlaw by Edward I. (1304), and having been captured by treachery at Glasgow (1305), was brought to London and tried and executed the same year.

Wallace, William (1768-1843), a mathematician, born in Dysart,

and the chorograph, and besides contributing to various mathematical journals wrote: *A New Book of Interest; Geometrical Theorems and Analytical Formulae*.

Wallace, William (1844-97), a philosopher, born at Cupar, Fife. He was professor of moral philosophy at Oxford in 1882-97, and published *The Logic of Hegel*, 1873; *Hegel's Philosophy of Mind*; *The Life of Arthur Schopenhauer*, 1890.

Wallace, William Vincent (1814-65), a composer. W. was an Irishman, born in Waterford. He was leader of the orchestra in a Dublin theatre for a number of years. His first opera *Mariana* was produced in 1845 and was a success. He toured the U.S.A. and S. America, and travelled in Germany. Other operas of his are *Lurline*, 1860; *The Amber Witch*, 1862; and *Lore's Triumph*, 1862.

Wallace's Line, an imaginary line which separates the Oriental from the Australian faunas. It was so called in compliment to Alfred Russel Wallace (q.v.), who defines the course in his *Island Life*, 1880. The line passes between the Sulu and Philippine Is., along the Straits of Macassar and between Lombok and Java, and the fauna to the W. of it is

E. of
res of
only

Wallachia, a part of Romania, between the Carpathians and the Danube, and the Black Sea and Servia.

Wallaroo, a seaport on West Bay, Spencer Gulf, S. Australia. In a

let. Pop. 3800.
or. (since April 1,
England, in the
n. N.W. of Birk-

sey Embankment
was constructed to prevent the
of the sea on the
sula. There are sub-
ns of an ancient forest.
514.

Walla, a co. seat of Walla
wana co., Washington, U.S.A., on Mile
Creek. It is the centre of an im-
portant wheat-growing district. Pop.
(1910) 19,364.

Wallenstein, or Walstein, Albrecht
Wenzel Eusebius von (1583-1631),
Duke of Friedland, born in Bohemia.
His father was a Protestant, but he
early determined to embrace the
Catholic faith. Took part in the war

between the Archduke Ferdinand and the Venetians. On the outbreak of the Bohemian revolt he obtained the command of an army, defeated Mansfeldt (*q.v.*), and conquered a great stretch of country. He was created Duke of Mecklenburg by the emperor. Resigned his command in 1830, but had it restored again the next year. In 1632 Gustavus Adolphus invaded northern Germany. W. met him at Lützen, Nov. 1632, and a fierce battle took place, but in spite of W.'s efforts the battle was a triumph for the Protestants. Gustavus, however, was killed. Seeming to lack vigour in continuing the war, he was accused of allying at sovereignty, and was disgraced. He retired to Egra, where he was murdered. Schiller dealt with his life both in prose and in poetry. See *Life* by L. von Ranke, 1910.

Waller, Edmund (1606-87), an English poet, born at Colehill, Bucks. He was a student of Lincoln's Inn in 1622, and four years later was M.P. for Chipping Wycombe, and for Ameresham in 1628 and 1640. In this latter year he sat in the Long Parliament, and was chosen by the House to conduct the impeachment of Crawley for his judgment in the ship-money case. But he was at heart a royalist, and having been caught plotting to seize London for Charles I., was arrested and expelled the House (1643). He was prisoner in the Tower (1643-44), but his sentence of death was commuted to a heavy fine and banishment. He was, however, pardoned in 1651 by Cromwell's influence, and published laudatory verses upon him in 1655 entitled: *A Panegyric to my Lord Protector*. But he also wrote poems of rejoicing on Cromwell's death (1658), and in 1660 published *To the King, upon his Majesty's Happy Return*. His *Divine Poems* appeared in 1685.

Waller, Sir William (c. 1597-1668), a parliamentary general, was the son of Sir Thomas W., lieutenant of Dover. Becoming a soldier, he served in Bohemia (1620) and the palatinate (1621-22), and at the outbreak of the Civil War was made a colonel in the parliamentary army. He took Portsmouth (1642), Hereford (1643), and Arundel Castle (1644), but was removed from command in 1645 by the self-denying ordinance and became a Presbyterian leader in parliament. In 1647 he began to levy troops to resist the army, and was imprisoned by that faction (1648-51). He was again arrested in 1659 and imprisoned in the Tower for having plotted a royalist rising, but recovered his seat in parliament (1660), and sat on the council of state the same year.

Wallflower (*Cheiranthus cheiri*), a fragrant cruciferous perennial plant, a number of beautiful varieties of which are now grown in gardens, bearing yellow, brown, red, and variegated flowers. They are usually treated as biennials, the seed being sown in May.

Wallin, Johan Olof (1779-1839), a Swedish poet, born in Dalecarlia. Having studied at Upsala he entered upon a clerical career, and after preaching at Solna, Ulriksdal, and Vesterås, became archbishop of Upsala. His poetry is chiefly religious in character. Among his secular poems are *Uppfostraren* (The Educator), which won a prize at the Swedish Academy, and a song on George Washington.

Wallington, a parl. bor. on the W. bank of the Thames, about 50 m. from London. It has ancient Roman remains, and appears in the Domesday Book. It has a large number of interesting churches. Pop. 2800.

Wallington, a tn. in New Haven co., Connecticut, U.S.A., with silver plate works and manufactories of buttons, britannia and brass ware. Pop. (1910) 11,155.

Wallington, a par. of Surrey, England, 2 m. S.W. of Croydon, noted for its cultivation of lavender. Pop. (1911) 5200.

Wallis, John (1616-1703), a mathematician, was Savilian professor of geometry, Oxford, 1649-1703, and keeper of the archives, 1658-1703. He introduced the principles of analogy and continuity into mathematical science, and widened the range of the higher algebra. He published *Arithmetica Infinitorum*, 1655, which contained the germs of the differential calculus, and invented the symbol ∞ for infinity.

Wallon, Alexandre Henri (1812-1904), a French historian and politician. He began his political career as deputy for Guadeloupe in 1848. On his return to the Chamber of Deputies in 1891, he set about the formation of a party which bore his name. The work which he did towards the establishment of the laws of the Republic of 1875 earned for him the title in the political world of 'Father of the Constitution.' Among his works are: *The Authority of the Bible*, 1889; and *Monotheism among the Semitic Races*, 1859.

Walloons, inhabitants of certain parts of Belgium, who, though of Celtic stock, speak a French patois. This dialect is of the same group of languages as modern French, but contains also some Celtic roots. Phonologically, it tends to narrow the vowels or to render them indeterminate as contrasted with French.

The people in appearance resemble the Cornish.

Wall-paper, a coloured or decorated paper used as an ornamental covering for the inner surface of the walls of a room. Plain coloured paper may be 'ingrain', when the colour runs throughout the substance of the paper, or printed, when the colour is only on the surface. Some of the best patterned papers are 'hand-printed'; that is, the colours are laid on with wooden blocks, the finer details being supplied by strips of copper placed edgewise in the block. A large number of excellent papers are machine-printed, and these are usually cheaper. The price is not a good index of the artistic or intrinsic value of a W. Exclusive designs are invariably expensive, but are reduced in price as they become more widely produced. Enormous quantities of inartistic papers are printed to appeal to a crude taste, but there is no difficulty in purchasing effective designs at no greater cost. Pictorial patterns should be avoided except for nursery decoration; conventional designs are more pleasing and less exhausting. In general, large designs should only be used for large rooms. Dining-rooms are well suited by browns and reds of rich tone, libraries and studies by subdued blues and greens; drawing-rooms should give a light effect; bedroom decoration should not be too glaring nor too gloomy, and any design that presents rows of conspicuous details in any direction should be avoided. In calculating the number of pieces of W. needed for a room, it should be remembered that a piece of English-made paper measures 12 yds. by 21 in., French paper 9 yds. by 18 in., and Japanese paper 12 yds. by 36 in.

Wallsend: 1. A tn. n. n. bor. of Northumberland, the Tyne. Its name is taken from its position at the end of the old wall. Its chief industries are ship-building, metal smelting and manufacture, and chemicals. Pop. 22,416. 2. A tn. of New South Wales, Australia, 13 m. from Newcastle, a great colliery centre. Pop. 4500.

Wall Trees, the only method of growing some of the more delicate trees in the open, a wall or a pro-
vid-
to ex-
clude frost, but bloom can be protected by placing poles against the wall at a slight slant and stretching over them sacking, scrim, or other material.

Walmer, or **Walmerstreet**: 1. A tn. and watering-place on the coast of

Kent. It was in ancient times one of the Cinque Ports, and is one of the reputed landing-places of Julius Caesar. Walmer Castle is a relic of the days when it was an important place to be defended from foreign inroads. Pop. 5848. 2. A township and holiday resort of Cape Colony, district of Port Elizabeth. Pop. 1920.

Walney Island, off the N.W. coast of Lancashire, between Morecambe Bay and the mouth of the Duddon, near Barrow-in-Furness.

Walnut (*Juglans regia*), a handsome and useful tree, hardy in Britain though not a native. Beside its nuts, which are of much value as a dessert delicacy, the wood is in great demand by cabinet-makers. Sugar has been made from the sap, and the aromatic leaves have been used in pharmacy. The rind of the fruit yields a dark brown dye, and the seeds contain an oil used by painters as a drying oil.

Walpole, Horace, fourth Earl of Orford (1717-97), born in London, being the youngest son of Robert W., the English statesman. Even while at school he was well provided for by the sinecures which, by the influence of his father, he held. At the age of twenty-two he started on a continental tour, which formed so essential a part of the education of the gilded youth of the 18th century. He visited Franco and Italy together with the poet Gray. Whilst on the tour he met Horace Mann, with whom he maintained a correspondence for some very considerable period. He returned to England, having quarrelled with Gray, and entered parliament. He held a seat in parliament continuously up to 1768. It is, however, not as a politician but as an author that he is famous. His memoirs and correspondence are of the greatest

the life and
th century.
of one of the
In England
gave him an insight into politics
which was as deep as it was erudite.
He was a
some very
at Straw
from 1747, and his house became the
centre of fashionable learning in Eng-
land. He set up a printing press there
and published much that was his own
and his friends. Gray's *Odes* were
issued from here, as was the *Castle of
Otranto*, which established a new kind
of romantic novel, a novel gloomy
As an anti-
following
*Royal and
1738: Life
and Reign of Richard III., 1768;
Anecdotes of Painting in England,
1762-71.* Amongst the more hu-

portant of his memoirs may be mentioned: *Memoirs of the Last Ten Years of the Reign of George II.*; *Memoirs of the Reign of George III.* 1771; and *Journal of the Reign of George III.* 1771-83. See also *Life* by Austin Dobson, 1890; L. B. Seeley, *Horace Walpole and his World*, 1884; *Walpole's Letters to Sir Horace Mann* (Review and Essay by Lord Macaulay), 1833; A. D. Greenwood, *Horace Walpole's World*, 1913.

Walpole, Robert (1676-1745), an English statesman, born at Houghton in Norfolk. A Whig by persuasion and upbringing, he entered parliament in 1701 as M.P. for Castle Rising, and in the next parliament, the first of the reign of Queen Anne, for Lynn. He quickly distinguished himself, and in 1708 he became secretary for war. On the accession of the Whigs in 1710 he was accused of peculation, a somewhat crime and charge, and was his office and sent to the 7.

Protestant succession, however, restored him to favour, and in 1715 he became Chancellor of the Exchequer, and practically George I.'s chief minister. On the dismissal of Townshend, he also resigned and opposed strongly the policy of Stanhope and Sunderland. His greatest victory in opposition was the rejection in 1718 of the Peerage Bill, which limited the prerogative of the Crown and which would have increased enormously the power of the House of Lords. The mania for speculation culminated in 1721 in the South Sea Bubble, public credit was at a discount, and the country seemed to be on the verge of ruin. But W. made these ruins stepping stones to success. He became the chief minister. No longer, he declared, should the firm be Townshend and Walpole, but Walpole and Townshend. He now became the virtual ruler of England, and acquired the office of Prime Minister. Since the king spoke only German and could not understand English, W. presided over the cabinet. His policy was a policy of peace. As a financial minister, few have equalled him. He had no high ideals, but was actuated throughout by motives of strong common sense. On the death of George I. his position seemed to be imperilled, but Caroline of Anspach realised his true ability, gave him her support, and kept him in office. His excise scheme of 1733 would have made London a free port, but was not popular since it was not understood. He remained in office until 1742. In 1739 the war of 'Jenkins Ear' was declared, and W. ought to have resigned since he had declared war much against his will, but he

clung obstinately to office, and only resigned when his majority had dwindled to two. His enemies tried to impeach him, but he was still strong enough to escape that. He was raised to the peerage as the Earl of Orford, and died three years after he had given up office. See Cox, *Life of Walpole*, 1798; Morley, *Walpole* (Twelve English Statesmen).

Walpurga, St. (otherwise Walburga) (d. c. 779), followed her brothers St. Willibald and St. Wunnibald (sons of a king of the West Saxons), in the time of St. Boniface, from her native country, England, to Germany, to help them in extending Christianity. After the death of Wunnibald she directed his convent at Heidenheim until her death. Her bones, from which, according to the oldest biography, a miraculous healing oil flowed were transferred to Eichstadt, where

erected in her honour. Germany, and even in Netherlands, and England, churches and chapels were dedicated to her. The feast of W. falls properly on Feb. 25, but as in some German calendars it is assigned to May 1, the name of W. has become associated, in a quite accidental way, with some of the most noted popular superstitions.

Walrus, Sea Horse, Sea Cow, or Morse (*Trichechus rosmarus*), a large marine carnivore confined to the Arctic Circle, though formerly of much wider range, it having been ruthlessly hunted for its immense tusk-like upper canines, its hide, and its oil. It is a gregarious animal, and quiet and inoffensive in disposition except during the breeding season, or if attacked, when it is capable of fighting fiercely and of inflicting terrible blows with its tusks by quick turns of the neck. It averages 10 to 12 ft. in length, though specimens nearly twice as long are recorded. The muzzle is divided between the nostrils, and bears bristly moustaches. The eyes are small, and there is no external ear. The adult animal has only one incisor and three premolar teeth at each side of the upper jaw beside the tusks; in the lower jaw three premolars and one small canine only occur on each side.

Walsall, a market tn., co. and municipal bor. of Staffordshire, England, 8 m. N.W. of Birmingham. It has trade in harness, saddlery, and leather goods as well as in engineering and hardware. Pop. (1911) 92,115.

Walsh, William (1663-1708), an English poet and critic, born at Abberley, Worcestershire. He sat in parliament for Worcester (1698, 1701, 1702), and for Richmond (Yorkshire), (1705-8). He was a friend and corre

spondent of Pope, and a literary collaborator of Vanbrugh and Congreve. His writings include a *Dialogue Concerning Women*, 1691; *Letters and Poems*, 1692; and *Esculapius*, published posthumously, 1714. See his *Letters in Elwin and Courthope's* edition of Pope (vol. vi.), and *Life* by Cibber, 1753.

Walsham, North, an urban dist. and market tn., Norfolk, England, 14 m. N.E. of Norwich. Pop. (1911) 4254.

Walsingham, a tu. Norfolk, England, 6 m. N.E. of Fakenham. has an Augustine priory (12th century) with a shrine of the Virgin much visited by mediæval pilgrims. Pop. (1911) 900.

Walsingham, a tu., Norfolk, England, 4½ m. S. of Wells, has an Augustine priory (12th century) with a shrine of the Virgin much visited by mediæval pilgrims. Pop. 900.

Walsingham, Sir Francis (c. 1530-90), an English statesman, was educated at King's College, Cambridge. He travelled, during Queen Mary's reign, studying foreign politics, but on the accession of Elizabeth returned to England, and in 1569 acted as chief of the secret service in London. He was envoy to Paris to ask indulgence for the Huguenots, 1570, and two years later protected the English Protestants during the St. Bartholomew massacre. From 1573 to 1590 he was secretary of state, and was frequently employed by Elizabeth in foreign affairs although she neglected his advice. He secured the conviction of William Parry, 1585, Anthony Babington, 1586, and Mary Queen of Scots, 1586, and it was he who urged

Waltham Watch Company, the largest watch factory in the world, and numerous cotton mills. The city also produces automobiles, carriages and waggon, bicycles, organs, saddlery, harness, furniture, and men's clothing. Pop. (1910) 27,834.

Waltham, Waltham Abbey, or Waltham Holy Cross, an ancient market tn. on the R. Lea, 12½ m. from London. The first notice of it occurs in the reign of Canute, but it is now famous chiefly for its ancient abbey church. There are also large powder-mills belonging to the government. Area 11,870 acres. Pop. 6846.

Walthamstow, an urban dist., Essex, and suburb of London, 6 m. N.E. of Liverpool Street. Pop. (1911) 125,356.

Walther von der Vogelweide (c. 1160-1230), the greatest of the German minnesingers, was probably a native of Tyrol. He was of noble birth, and having learned his art under Reinmar the Old, found a patron in Duke Frederick I. at the court of Vienna where he stayed until 1198. After this he visited several towns, including Mainz and Magdeburg, and in 1204 won the poetical contest at the Wartburg.

Walton, Brian (1600-61), an English divine, born in Cleveland dist., Yorkshire. He was incumbent of St. Martin's Orgar, London, 1628-41, and of Sandon, Essex, 1636-41, but being ejected from his livings for ritualism, withdrew to Oxford where he studied oriental languages. In 1647 he came to London and devoted himself to his great *Polyglot Bible* (6 vols. 1654-57), in which nine languages are used:

Thaldee, Ethiopic, Greek, Hebrew, Persian, Syriac, and Latin.

He was consecrated

Chester in 1660. Other

an *Introductio* to Oriental

and *Considerator Con-*

ference of the Polyglot.

Izaak (1593-1683), the

The *Compleat Angler*, born

nt Stafford. He was apprenticed to an ironmonger in London after very little schooling, and by 1611 was in possession of a business of his own. He had before 1619 begun to write verses, and in 1640 he prefixed a life of Donne to the first folio edition of that author's *Sermons*, which was much approved by John Hales. He afterwards

edition of

1651 he

of

Wotton, and two years later produced

his famous treatise *The Compleat*

Angler, or *The Contemplative Man's*

Recreation. The first edition differs

materially from the second, which

appeared under W.'s superintendence

Henry V. He compiled *Chronicon Angliæ*; *Ypodigma Nestriæ*, a record of events in Normandy, and *Chronica Majora*, now lost.

Walsoken, an urban dist. on the border of Norfolk, England, 1 m. N.E. of Wisbech of which it is a suburb. Pop. (1911) 3898.

Walter, John, founder of the *Times* (q.v.).

Walterhausen, a tu., Saxo-Coburg-Gotha, Germany, 7 m. W.S.W. of Gotha, on the Bodowasser; has a mediæval castle used for administrative purposes, and various manufs. Pop. 7534.

Waltham, a city of the U.S.A., in Middlesex co., Massachusetts, 9 m. W. of Boston. It has the American

in 1655. The former is in the form of a dialogue between Piscator and Viator, while the latter has three characters, Piscator, Venator, and Auceps. In 1665 he gave to the world his *Life of Richard Hooker*, and in 1670 appeared his *Life of George Herbert*, followed in 1678 by that of *Bishop Sanderson*. Cotton's dialogue between Piscator and Viator was published as a second part in the 5th edition of *The Compleat Angler*.

Walton-le-Dale, an urban dist. of N.E. Lancashire, England, on the Ribble, 2 m. S.E. of Preston, has cotton mills, corn mills, and iron foundries. Pop. (1911) 12,352.

Walton-on-Thames, an urban dist. and tn. of Surrey, England, 5 m. S.W. of Kingston; a favourite resort for boating and angling. Pop. (1911) 12,858.

Walton-on-the-Hill, a tn. of S.W. Lancashire, England, is now a suburb of Liverpool.

Walton-on-the-Naze, or Walton-le-Soken, an urban dist. and par. of N.E. Essex, England, 7 m. S. of Harwich, is a favourite watering-place, with a regular service of steamers from London. It is chiefly modern, the ancient church and village having been engulfed by the sea. Pop. (1911) 2175.

Waltz, a dance, introduced on the continent early in the 19th century, for any number of separate couples. The music is in three-four time and the motion is a gliding and revolving one. Among the most popular composers are the two Strausses. The Ws. composed by Chopin and Liszt are of quite a different order, and are not intended for use as dance music.

Walworth, a dist. and parl. div. of the bor. of Newington, Surrey, England. Pop. 60,000.

Wampum, the shell beads used by the N. American Indians for dress ornamentation, for symbolic belts exchanged in inter-tribal treaties, and as a regular currency between them and the early colonists.

Wandering Jew, The, *see* JEW, THE WANDERING.

Wanderoo, a name properly applied to the Ceylonese species of *Semnopithecus*, or Sacred Monkeys, but also given to *Macacus silenus*, a monkey with a large lion-like mane or ruff.

Wandewash, a tn. of North Arcot District, Madras, British India, the scene of several engagements in the Carnatic Wars. Pop. (1901) 5971.

Wandsbeck, or Wandsbeck, a tn. of Schleswig-Holstein, Prussia, 3 m. N.E. of Hamburg, of which it practically forms a suburb, has breweries, distilleries, and oleograph factories. There is a monument to Claudius, author of *Der Wandsbecker Bole* (1771-75). Pop. 35,212.

Wandsworth, a metropolitan and parliamentary bor. and parish in the co. of London, England. It is the largest of the metropolitan boroughs (9108 acres) and includes the parishes of Putney, Clapham, Streatham, Balham, and Tooting. The industries include oil-mills, dye-works, paper-mills, calico-printing, and breweries. Pop. (1911) 311,402.

Wanganui: 1. A tu. and port, North Is., New Zealand, on the Wanganui R., 134 m. N. of Wellington by rail; has refrigerating works and a collegiate school. Pop. 8200. 2. A riv. of North Is., New Zealand, rises near Mt. Tongariro and discharges on the W. coast, 60 m. S.E. of New Plymouth. Length 120 m.

Wangaratta, a tn. of Victoria, Australia, 130 m. N.E. of Melbourne, at the junction of the Ovens and King rivers, and the counties of Bogong, Delatite, and Moira; is the centre of an agricultural and fruit-growing district. Pop. 3500.

Wanks, *see* Coco.

Wanley, Rev. Nathaniel (1634-80), an English divine and compiler, born at Leicester. He became rector of Beeby, Leicestershire, and vicar of Trinity Church, Coventry (1662). He published *The Wonders of the Little World* (1678), a treatise, with anecdotes, on the prodigies of human nature, and a funeral sermon, *Peace and Rest for the Upright*, 1681.

Wanlockhead, a vil. of Dumfriesshire, Scotland, 1½ m. S.W. of Leadhills, has lead mines opened in 1680. Pop. (1911) 620.

Wanstead, an urban dist. of Essex, England, 7 m. N.E. of London. Pop. (1911) 13,830.

Wantage, a market tu. of Berkshire, England, 13 m. S.W. of Oxford. It is famous as the birthplace of Alfred the Great (849), to whom a statue by Count Gleichen, was erected in 1877. Bishop Butler (1692-1752), author of *The Analogy of Religion*, was also a native. Pop. (1911) 3628.

Wapakoneta, a tn. and co. seat of Anglaize co., Ohio, U.S.A., 12 m. S. by W. of Lima, is the centre of an agricultural and manufacturing (furniture, hollow-ware, and chairs) district. Pop. (1910) 5349.

Wapenshaw (A.-S. *waepen*, weapon; *scaavian*, to show), in Scots feudal history, an exhibition of arms, according to the rank of the individual, made formerly at certain times in every district. Such exhibitions or meetings were not designed for military exercises, but with the object of showing that the lieges were properly provided with arms. The name is sometimes used now to denote the periodical meetings of volunteer corps.

Wapiti, or *Cervus canadensis*, a

large and magnificent deer once widely distributed throughout N. America, now limited to the Rockies and the Cascades. The bull stands from 4-5 ft. at the shoulder, and the antlers are large and finely developed.

Wappers, Egide Charles Gustave (1803-74), a Belgian painter, born at Antwerp. His first exhibited picture, 'Devotion of the Burgomaster of Leiden' (1830), received immediate recognition as a great work, and W. was appointed professor of painting at Antwerp (1832), director of the Academy (1840-53), and president of the Belgian National Museum (1846-53). His other paintings include 'Episode of the Belgian Revolution of 1830,' 'Christ at the Tomb,' 'Cambes,' and 'The Defence of Rhodes.'

Wapping, a dist. of London, on the N. bank of the Thames, in the metropolitan bor. of Stepney. The London Docks are here.

War. The conduct of modern warfare is very different to that of the Ws. of the past. Although it is almost a contradiction in terms to speak of civilised W., nevertheless W. in its conduct is much more humane than it previously was. The absence of looting and of the molestation of peaceful inhabitants has done much to make W. less dreadful than heretofore. W. as waged in Roman times was at least disciplined and organised, but the downpour on the Roman empire of Goths, Huns, and Vandals reduced warfare to methods of barbarism. Improvement was slow but sure during the feudal period, the mediæval idea of chivalry having much to do with this. But the introduction of gunpowder and the perfecting of modern fire arms have done much by its power of quick annihilation to make W. more terrible but at the same time less brutal and barbarous. The inventions of modern times have made W. a speedier matter than previously it was. Mobilisation is rapid, transit is rapid, and communications are rapid. The results of W. nowadays are also more terrible and more far-reaching than they were in the past, so that in a manner W. itself acts as a threat to the nations. W. may be either defensive or offensive, but many of the foreign wars of the last century have been more gaily coloured.

War, usually both. The influence of sea power cannot well, however, be over-estimated. The navy is of use for defence, for conveying transports, and for offence against another maritime power. In the second volume of *On War of To-day*, by Friedrich von Bernhardi, translated by Karl von Donat (1913, Rees), that famous military expert points out that to act

offensively is almost imperative in modern warfare, and goes on to say that when an army is for the time compelled to act on the defensive it should only do so until it finds it possible to take up the offensive. Tactical efficiency and strategic mobility are of the utmost importance.

Warasdin, see VARASDIN.

Waratah: 1. A tn. of Northumberland co., New South Wales, 4 m. N.W. of Newcastle, has coal mines, copper and tin smelting, stone quarries, brick-making, and fruit-growing. Pop. 3100. 2. Or Mount Bischoff, a post tn., Russell co., Tasmania. 82 m. W. of Launceston, has some of the richest tin-mines in the world, also gold, silver, and bismuth. Pop. (district) 5000.

Warbeck, Perkin (1474-99), a pretender to the English throne in the reign of Henry VII. He was a native of Tournay, and appeared in 1490 at the Burgundian court in the character of the younger of the two princes whom Richard III. was held to have murdered in the Tower. Here he was made welcome by his 'aunt' (the Duchess of Burgundy). He was received in England and also at the court of the French king. Going to Scotland, he was received by James IV. and given Catherine Gordon as a wife. In 1498 he invaded the S.W. of England, besieged Exeter, but was captured and brought to the Tower. In the following year he managed to escape, but was recaptured and executed.

Warblers, or *Sylviidae*, a family of passerine birds distinguished from the thrushes by their more delicate structure and more subulate bill. They include some of the choicest songsters. Among the numerous British Ws. are the nightingale (*Luscinia luscinia*), robin (*Erithacus rubecula*), chiff-chaff (*Phylloscopus collybita*), gold-crested wren (*Regulus cristatus*), and the hedge sparrow (*Acrocephalus modularis*). The birds popularly called Ws. include the garden W. (*Sylvia salicaria*), the grasshopper W. (*Acrocephalus narvius*), the Dartford W. (*Melospiza undatus*), the reed W. (*A. streperus*), the sedge W. (*A. phragmitis*), and many of the foreign Ws. are also of unpretentious appearance, but many of the foreign Ws. are more gaily coloured.

Warburton, an urban dist. of W. Lancashire, 7 m. N.E. of Bolton, has a castle (12th century). Pop. (1911) 3773.

Warburton, Bartholomew Elliott George, usually known as Elliot Warburton (1810-52), an Irish author, born at Aughrim, co. Galway. He was called to the bar (1837), but spent most of his time in travelling. He

perished in the burning of the *Amazon* on his way to Panama. He published *The Crescent and the Cross*, 1844; *Memoirs of Prince Rupert*, 1849; and *Darien, or the Merchant Prince*, 1851.

Warburton, John (1682-1759), an English antiquary and Somerset herald in the College of Arms (1720-59), was born in Lancashire. He collected manuscripts and rare books, and his unique collection of Elizabethan plays is supposed to have been burnt by his cook. The remainder of his collection was sold in 1766. W. made a survey of the Roman Wall (1753) and published maps of Northumberland (1716), Middlesex (1749), and other counties.

Warburton, Peter Egerton (1813-89), an English Australian explorer and author, born near Norwich. He travelled through N.W. Australia on a camel and narrowly escaped starvation in the desert. He published *Major Warburton's Diary*, 1866; and *Journey Across the Western Interior of Australia*, 1875.

Warburton, Sir Robert (1842-99), a British soldier, born in Afghanistan. He took part in the Abyssinian War (1867-68) and in the Afghan War. From 1879-97 he was warden of the Khyber Pass. He served with the Tirah expedition (1897-98). He wrote *Eighteen Years in the Khyber*, 1900.

Warburton, William (1698-1779), an English author and divine, was born at Newark and educated at the grammar school there. On leaving school he was placed in an attorney's office, and in 1719 he set up in business at his native town. He was ordained deacon in 1723. His literary productions were numerous, and filled seven volumes when collected in 1788 by Bishop Hurd. He materially assisted Theobald in his edition of Shakespeare (1733), and there is little doubt that this work owes much of its excellence to the advice of W. In 1799 he was made Bishop of Gloucester. He was a great friend of Pope, whose *Essay on Man* he vigorously defended in his *Works of the Learned*.

Ward, a minor who has been legally placed under the care of a guardian (q.v.). The term is also used for a subdivision of a city for civic purposes.

Ward, Artemus, see BROWNE, CHARLES FARRAR.

Ward, Edward (1667-1731), an English humorist and satirical writer, born in Oxfordshire. He kept a tavern in Moorfields, London, and published a great deal of coarse verse satirising the Whigs and the Low Church party. For his *Hudibras Redivivus*, 1705, he was twice condemned to stand in the pillory.

Ward, Edward Matthew (1816-79), an English historical and genre painter, born at Pimlico, London. He studied in the Royal Academy Schools, at Rome, and at Munich under Cornelius. His 'Cimabue and Giotto' won him instant recognition in London. In 1847 he was elected A.R.A., becoming full R.A. in 1855. His paintings include eight frescoes in the House of Commons (1853); 'Dr. Johnson in the Anteroom of Lord Chesterfield,' 1845, and 'South Sea Bubble,' 1847, in the National Gallery; 'Charles II. and Nell Gwyn,' 1848. See Dafforne, *Life and Works of E. M. Ward*, 1879.

Ward, Elizabeth Stuart (née Phelps) (1844-1911), an American novelist and philanthropist, born at Andover, Massachusetts. In 1888 she married the Rev. Herbert D. Ward. Many of her books were of a religious or mystical character. She published *The Gates Ajar*, 1868; *Men, Women, and Ghosts*, 1869; *Hedged In*, 1870; *The Silent Partner*, 1871; *Poetic Studies*, 1875; *The Story of Avis*, 1877; *Doctor Zay*, 1882; *Beyond the Gates*, 1883; *Come Forth*, 1890; *Avery*, 1902; *Trixy*, 1905; *The Oath of Allegiance*, 1909. See her *Chapters from a Life*, 1896.

Ward, Harry Marshall (1854-1906), an English botanist, was educated at Owens College, Manchester, and Christ's College, Cambridge. He was cryptogamic botanist to the Ceylon government (1880-2); professor of botany at the Forest School (1885-95) and at Cambridge University (1895-1906). His works include: *Timber and Some of its Diseases*, 1889; *The Oak*, 1892; *Grasses*, 1901; *Diseases of Plants*, 1901; and *Trees*, 1904-5.

Ward, James (1769-1859), an English animal and genre painter and engraver, born in London. In 1791 he was appointed painter and mezzotint engraver to the Prince of Wales; in 1807 he became A.R.A., and R.A. in 1811. His best pictures include: 'Alderney Bull, Cow, and Calf,' 'Cattle Piece,' 1807; 'Fighting Bulls' and 'Donkey and Pigs' (S. Kensington Museum). His best mezzotints are: 'Cornelius' after Rembrandt, and 'Mrs. Bellington,' after Reynolds.

Ward, John Quincy Adams (1830-1910), an American sculptor, born at Urhano, Ohio. From 1850-56 he studied under H. K. Brown, assisting him with the equestrian statue of Washington in Union Square, New York. In 1861 he opened a studio in New York City. In 1863 his 'Indian Hunter' was erected in Central Park, where also are his 'Freedman' and 'Shakespeare.' He executed the colossal statue of Washington for the Treasury Buildings.

Ward, Nathaniel Bagshaw (1791-1868), an English botanist, born in London. In 1833 he invented the Wardian case (q.v.) by which growing plants can be sent from one part of the world to another without being injured. The banana was introduced into Fiji and Samoa, and tea from Shanghai to the Himalayas by its means. He published: *On the Growth of Plants in Closely-glazed Cases*, 1842.

Ward, Robert Plumer (1765-1846), a politician, was called to the bar in 1790, and entered parliament twelve years later. He was Under-Secretary for Foreign Affairs (1805-6), a commissioner of the Admiralty (1807-11), and Clerk of the Ordnance from 1811 until 1823, when he retired from parliament, and was appointed by Perceval Auditor of the Civil List. He was the author of three novels, and he kept a diary from 1809, a portion of which was published in 1850. There is a biography by Phipps.

Ward, William George (1812-82), an English Roman Catholic theologian and philosopher, born in London. He went to Oxford and soon fell under the influence of Newman to whose views he had previously been opposed. He openly defended Newman's *Tract XC.*, 1841, and in 1844 clearly defined his views in *The Ideal of a Christian Church*. In 1845 he entered the Roman Catholic Church and became professor at St. Edmund's College, Ware (1852-58). He was editor of the *Dublin Review* (1863-78) and a leader of it.

Warden, in . . .
appointed for the protection of st . . .
The W. of the Cinque Ports was created by William the Conqueror with extensive jurisdiction over the adjacent coast land. The Ws. of the marches were appointed to protect the boundaries between England and Scotland or Wales.

Wardha, a tn., Wardha dist., Central Provinces, India, 45 m. S.W. of Nagpur, is a great cotton centre. Pop. 10,000. The dist. has an area of 2420 sq. m. and pop. 390,000.

Wardian Case, a small glass struc-

The authorship of *Sir Patrick Spens*, *The Douglas Tragedy*, and other ballads has also been claimed for her, but with very doubtful justification.

Wardmote. In the city of London an annual court or meeting held in each ward of the city under the presidency of the alderman. Its powers, which formerly extended to matters concerning the watch, the police, etc., are now merely nominal. The common councillors of the city are elected at the W.

Wardroom. In old naval ships the room, placed immediately over the gunroom, where the lieutenants and other principal officers slept and messed. In a modern man o' war it is a cabin for the accommodation of lieutenants, and other officers of W. rank, including pursers, naval instructors, doctors, and engineers.

Wardship in feudal times, an incident of tenure (q.v.) by knight service. This right gave the lord the guardianship in chivalry of the heirs (males under twenty-one and females under fourteen) of his tenants, and with such guardianship the right to the lands of the heir, without having to account for the profits, until the latter came of age. W. was abolished under the Commowwealth.

Ware: 1. An urban dist., Hertfordshire, England, on the Lea, 2 m. N.E. of Hertford, has malting and brick-making industries. The great bed of Ware, mentioned by Shakespeare, is now at Rye House. Pop. (1911) 5812. 2. A tn., Hampshire co., Massachusetts, U.S.A., on the Ware, 25 m. W. of Worcester; manufactures cotton and woollen goods, boots and shoes. Pop. (1910) 8774.

Ware, Sir James (1591-1666), an Irish historian, born in Dublin. In 1629 he was knighted for his *De Prasulibus Legionis*. He was auditor-general of Ireland (1632-19), M.P. for Dublin University from 1631-37, and again in 1661, a prisoner in the Tower and hostage in England (1611-47), and restored to his office in Ireland in 1660. Nearly all his writings deal with the history of Ireland.

Wareham, a municipal bor. and market ta., Dorsetshire, England, the Frome, near Poole Harbour, 1 m. E. of Dorchester, has the remains of a British earth-wall. Pop.

see BONDEN WAREHOUSE.

Warén, a tn., Mecklenburg-Schwerin, Germany, 20 m. N.W. of Neustrelitz, on Lake Müritz. Pop. 9134.

Waring, Edward (1731-98), an English mathematician, educated at Cambridge, winning the Lucasian

distances over sea; they are in pots and plunged in fibre. These cases are often the culture of filmy and other ferns in dwelling-rooms.

Wardlaw, Elizabeth, Lady (1677-1727), a Scottish poetess, born at Pitfirrane, Fifeshire, and married (1696) Sir Henry W. of Pitcairnie. She wrote *Harpykute* (1719) which she published as an ancient ballad.

professorship (1760). He took the degree of M.D. (1767), but did not practise for long, and is best known for his investigations on the algebraical curves, *Miscellanea Analytica* . . . 1762; *Proprietates Algebraicarum Curvarum* . . . 1772, etc. See *Genl. Mag.*, ii. 1798.

Warkworth, a small seaport of Northumberland, England, on the Coquet, 1 m. from the North Sea, 6 m. S.E. of Alnwick. The ruins of W. castle and W. hermitage (mentioned in Percy's *Reliques*) are near by. It has a 14th century bridge over the Dee. There are salt and brick manufs. Coal and fire-clay are worked near Amble. Pop. (1911) 720.

Warming, see HEAT AND HEATING.

Warminster, a tn. of Salisbury Plain (W.), Wiltshire, England, 8 m. S. of Trowbridge. It has an ancient chapel, an endowed grammar-school, and Roman remains near by. The malting and corn trade flourishes. Longleat with its deer-park, seat of the marquesses of Bath, is 5 m. S.E. Pop. (1911) 5492.

Warner, Charles (1846-1909), a stage-name of Charles John Liekfold, an English actor. He first appeared at Windsor Castle in *Richelieu*, during a command performance by Samuel Phelps's company (1861). He also played with Phelps during the latter's last appearances, as Buckingham in *Richard III.*, and De Mauprat in *Richelieu*. W. acted in *Leah Kleschna* (1905), as Leontes in *The Winter's Tale* (1906), and went to America (1907). See *Green Room Book*, 1909; *The Times* (Feb. 13, 1909).

Warner, Chas. Dudley (1829-1900), an American author, born at Plainfield, Massachusetts. He practised law in Chicago for some years. Among his works are: *My Summer in a Garden*, *Backlog Studies*, *Being a Boy*, *Life of Washington Irving*, *Life of Captain John Smith*, *In the Levant*, etc. He collaborated with Mark Twain in *The Gilded Age*, and was co-editor of *Harper's Magazine*, to which he contributed papers on the South, Mexico, and the Great West. He also edited a *Library of the World's Best Literature*.

Warner, Richard (1711-75), an English botanist and scholar, educated at Oxford. He collected and cultivated exotic plants, publishing *Plantæ Woodfordienses* (on plants found near his home, Woodford Row, in Essex) in 1771. Miller named the *Warneria* genus of plants after him. W. was noted for his critical knowledge of Shakespeare, and translated some comedies of Plautus. His library was bequeathed to Wadham College, Oxford.

Warner, Suran (1819-85), an

American authoress, born at New York, author of *The Wide, Wide World*, *Queechy*, *Melbourne House*, etc., published under the pseudonym of Elizabeth Wetherell. They are all domestic stories full of sentimentality and pathos. Her other works were mostly religious.

Warner, William (1558-1609), a poet, born in London, studied at Oxford, and was an attorney in London. In 1585 he published seven tales in prose entitled *Pan his Syrinx*, and in 1595 a translation of the *Menæchmi* of Plautus. His chief work was *Albion's England*, published in 1586 in thirteen books of fourteen-syllabled verse, and republished with three additional books in 1606.

Warnsdorf, a tn. (formed 1870), in the extreme N. of Bohemia, Austria-Hungary, on the Saxony frontier, 60 m. from Prague. Cotton and textile industries are important. Pop. about 23,220.

War Office, the headquarters of the British army, situated in a comparatively new pile of buildings in Whitehall. It was originally in the Pall Mall. The department, during the last Conservative government, was thoroughly overhauled and revised on the recommendation of a specially appointed committee over which Lord Esher presided. An army council was formed which consisted of the Secretary and Under-Secretary for War, together with the Financial Secretary and four military members. Each of these four members has some special department of the military service to superintend; they are responsible directly to the Secretary of State for War, who is, of course, directly responsible to parliament. Each of the divisions superintended by the military members is sub-divided, and each subdivision is under the control of a director who is responsible to the military members. The inspector-general of the forces, who has taken the place of the now obsolete commander-in-chief, carries out the plans of the army council and reports upon the efficiency of the men and the utility of the reforms.

Warracknabeal, or Werracknabeal, a township of Borung co., Victoria, Australia, 75 m. from Ararat. It manufs. carriages and implements, and has brass and iron foundries. Pop. 2600.

Warrandice, in Scots law, the obligation by which a party conveying a subject or right is bound to indemnify the grantee, disponent, or receiver of the right, in case of eviction, or of real claims or burdens being made effectual against the subject, arising out of obligations or

transactions antecedent to the date of the conveyance. W. is either *personal* or *real*. *Personal* W. is that by which the granter and his heirs are bound personally and is either *general*, when interpreted by the rules of *implied warrandice*, or *special*, which again is divided into (a) *simple*, viz., that implied in *from fact and deed*, v in transactions, or (c), by the granter is liable for every defect in the right which he has granted. *Real* W. is that by which certain lands, called W. lands, are made over eventually in security of the lands conveyed.

Warrant, an instrument authorising one to do something which otherwise he has no right to do. A police W. is issued by a justice on a written and sworn information of an offence; it is addressed to the constables of his district, specifies the offence, describes the person accused, and commands the police to arrest him and bring him before justices to answer the charge. It remains in force until executed, and if the criminal escapes into another district the W. can be 'backed' by indorsement of the justices of such district, so as to be enforceable against the criminal in such district. A general W. (i.e., one which purports to authorise the arrest of unnamed persons without previous evidence of their guilt or knowledge of their persons) to seize suspected persons and a general search W. empowering messengers to seize documents are alike illegal. See also ARREST, SEARCH WARRANT.

Warrant of Attorney, a written instrument executed by one person authorising another to confess judgment against him in an action for a certain named amount. It is often given by way of security by a prospective debtor and enables the creditor to obtain judgment against the debtor without the delay and expense of an action.

Warrant Officers. Naval.—The name applies to all officers who hold rank by virtue not of commission but of warrant. Formerly there were many more warrant officers than there are at the present time—officers whose work was continued even after the vessel had been off forming the bulk of them. officers who now hold commission were formerly of warrant rank. Cadets and midshipmen at the present day hold their positions by warrant and not by commission.

Military.—An intermediate step between a non-commissioned and a commissioned rank. The term W. O. is applied to the conductor of the Army Ordnance Corps, staff-ser-

geants, master gunners, corporal majors of the household cavalry, bandmasters, and schoolmasters. A soldier must attain the rank of sergeant before he is eligible for the warrant rank.

Warranty, a W. within the meaning of the Sale of Goods Act, 1893, is an

with reference to goods the subject of a contract of

reach of which gives a right to sue for damages, but not to reject the goods or treat the contract as repudiated. A representation made by the seller at the time of sale will only amount to a W. if made with that intention and the test of such intention is to determine whether the seller purported to assert a fact of which the buyer was ignorant. If not, then there is no W.; e.g., if a picture dealer describes some pictures as 'Anlial Studies, Landseer,' it is probable he is going further than to express a mere opinion; but if he describes them as having been painted by some remote painter, e.g., Parrhasius, his representation would be a mere opinion as no one could be sure of authenticity in such a case. (Lead-wine v. Slade.) The term 'sound' on the W. of a horse or other animals implies that the seller warrants the animal to be free of any disease or seeds of disease which would diminish or in process of time diminish the natural usefulness of the animal for the work to which it would properly and ordinarily be put. Temporary lameness, a cough, the defects of being nerved or chest-foundered, all constitute unsoundness, but not mere poorness of shape, crib-biting, nor roaring, unless symptomatic of actual disease. A general W. does not give a right to sue in respect of defects obvious to both parties, but in this respect it is to be observed that a purchaser is not bound to use extreme diligence in finding defects; and, again, it has been held in horse-cases that if the defect, though obvious, is not of a permanently injurious character, the purchaser can sue for damages. A W. to ground an action must have been made during the treaty for sale; a W. given after the sale would require a new consideration to support it. See

cap. of Trumbull Co., abounding R., 53 m. with manufactures of machinery, pottery, and steel, and iron and coal mines. Pop. (1910) 11,100. See *History of Trumbull County*, 1882, and by Upton, 1902. 2. The cap. of Warren Co., Pennsylvania, U.S.A., on the Conewango and Allegheny Rts., 49 m. E.S.E. of Erie. Oil and natural gas abound, iron-ore

and petroleum are found. It is named after the American patriot, Joseph W. Pop. (1910) 11,980. See Schenck and Rann, *History of Warren County, Pennsylvania*, 1887. 3. A tn. of Bristol co., Rhode Is., U.S.A., $6\frac{1}{2}$ m. from Fall R., Mass., on Narragansett Bay. Cottons, yarn, and cordage are among the manufactures. Pop. (1910) 6585.

Warren, in popular language, an enclosure made for the breeding of rabbits. The enclosure is usually effected with wire netting, about 6 in. of which is turned flat on the ground inwards. If the grass is good, it will support about twenty rabbits per acre, but overcrowding soon causes heavy mortality. Furze and juniper are often grown in Ws. and impart a good flavour to the flesh. Sometimes cabbage and other crops are cultivated for food.

Warren, Gouverneur Kemble (1820-82), an American general born at Coldspring, New York. He was educated at West Point for the army, which he entered at the age of twenty. He took an active part in the campaign of the American Civil War, being early in the war gazetted as brigadier-general of the volunteer corps. He was an extremely brilliant general, but his extreme brilliance led him into some positions which a less brilliant but safer man would not have entered. He fell under the suspicions of several generals and was finally relieved of his command by Sheridan, but was completely exonerated by the court of inquiry. He was promoted to the rank of brigadier-general in the regular army. As an engineer his survey work was extremely valuable.

Warren, Sir John Borlase, Bart. (1753-1822), an English admiral, born at Stapleford, Nottinghamshire. He entered the navy (1771) and saw service with Howe and Sir Charles Hardy in N. America, and in 1794 had command of a force which captured three French frigates. He protected British trade by this and similar deeds, but perhaps his best service was the defeat of a French fleet which planned a landing in Ireland (1798). In 1806 he captured the *Marengo* and in 1810 became an admiral.

Warren, Leicester, see DE TABLEY, JOHN BYRNE LEICESTER WARREN.

Warren, Samuel (1807-77), a Welsh lawyer and author, born in Denbighshire. He became Q.C. (1851), recorder of Hull (1851-74) and was an M.P. for three years. He wrote first for *Blackwood's Magazine*, in which appeared his *Passages from the Diary of a Late Physician* and *Ten Thousand a Year*, the latter scoring a great success. Other works are *Now and Then* and *The Lily and the Bee*.

Warrenpoint, a watering-place of Down co. (S.W.), Ireland, 7 m. S.E. of Newry, at the head of Carlingford Lough. Mourne Mts. rise behind it. Rosstrevor, a much-frequented watering place, is 3 m. E. Pop. (1911) 1800.

Warrensburg, the cap. of Johnson co., Missouri, U.S.A., on Black R., 50 m. E.S.E. of Kansas City. There are blue sandstone quarries, and stock-raising and agriculture are widely carried on. Pop. (1910) 4689.

Warrington (ancient *Walintune*), a municipal and parl. bor. of Lancashire, England, on the Mersey, 16 m. from Liverpool and Manchester. It is on the Manchester Ship Canal below the Latchford locks. There are iron, glass, cotton, leather, soap, beer, and chemical manufactures. W. has a cruciform parish church, a town-hall, and some old timbered houses. It was on the Roman road from Chester. Pop. (1911) 72,178.

Warrnambool, a seaport of Victoria co., Victoria, Australia, on Lady Bay, Pacific Ocean, 50 m. from Portland. There are salt-water baths, botanical gardens, a museum, a steepchase course, and factories. It has a fine harbour, and a lighthouse on the N. shore of the bay. Much sandstone is quarried. Pop. 6700.

Warsaw, formerly the capital of Poland, but now the capital of the Russian province of Poland. It is situated on the left bank of the Vistula, and lies about 695 m. S.W. of St. Petersburg. It is built in terraces which rise in tiers from the river. The town itself is surrounded by suburbs, the most important of which is Praga, which stands on the right bank of the river and is joined to the capital by a bridge. It is the third largest city of the Russian Empire, ranking next only to St. Petersburg and Moscow. Its buildings are particularly fine; it has many churches, Catholic, Greek, and Lutheran. The castle is a splendid building, and contains various art treasures. The town is well garrisoned by Russians, the army of occupation numbering well over 25,000. The university has been once suppressed, but has now nearly 100 professors and over 1000 students. The population of the city numbers 783,000, one-third of whom are Jews. The city played an important part in the struggle for independence, and is still the headquarters of the Russian revolutionists.

Warsop, a tn. of Nottinghamshire, England, 5 m. from Mansfield, on the Meden, $2\frac{1}{2}$ m. from Shirebrook station. There are horse and cattle fairs. Pop. (1911) 4224.

Wart, an excrescence caused by excessive growth of the tissues of the papillæ of the skin. Little is known

of the manner in which they are formed, and they usually appear and disappear without any apparent cause, especially in the young. They are very vascular, and are covered with some thickness of scaly epidermis, which easily becomes rubbed off. In children, the best course is to leave them alone, as they cause little inconvenience and ultimately disappear. In older people they should be treated, as there is always the possibility of them being the manifestation of a malignant growth. A variety of W., known as 'anatomic tubercle,' is occasionally found on the hands of those who handle the tissues of tuberculous subjects in dissections.

Warthe (Polish *Warta*), a riv. of Russian Poland, Prussia, and Germany, rising in Piotrkow gov., S.W. Poland, in the Carpathians, about 35 m. from Cracow, flowing N.W. and W. past Posen to join the Oder at Küstrin. It is about 450 m. long, navigable from Kolo, and connected with the Vistula through the Netze and the Bromberg canal.

Warton, Joseph (1722-1800), an English critic and poet, son of Thomas W., educated at Winchester and Oxford, where he formed a close friendship with William Collins. He wrote verses, and in his *Odes* and in his *Essay on Pope* he opposed the artificiality and the moralising in verse prevalent at the time. He edited Virgil in Latin and English, and wrote on Shakespeare and Homer, argued with Dr. Johnson, and was a member of the Literary Club. See

Warton, Thomas, English poet-laureate, of poetry, brother of Joseph (q.v.).

Warwick, Richard Neville, Earl of (1428-71), surnamed the Kingmaker. He was the eldest son of the Earl of Salisbury, and married the daughter and heiress of the Earl of Warwick, succeeding to the title in 1449. He was the most active of all the supporters of the Yorkist house, and his word carried great weight in their councils. In 1455 he won the first battle of St. Albans, and became the governor of Calais. He did not, however, attempt to dethrone Henry VI. until after the battle of Wakefield. In this battle the Duke of York was slain as was also Salisbury, the father of W. (1460). In the next year, in an attempt to protect London from the victorious wife of Henry VI., he was defeated, but the victory of Edward, Earl of March and York, son of the defeated leader of the Yorkists at Wakefield, and now head of the house of York, at Mortimer's Cross, enabled him to enter London and proclaim Edward king as Edward IV. This was followed up by the crushing defeat of the Lancastrians at Towton (1461), and thus the Yorkist dynasty was placed on the throne of Henry VI. being placed in

Warwick: 1. The cap. of Warwickshire, Central England, on the Avon, 20 m. S.E. of Birmingham. Warwick Castle, an old fortress, contains fine paintings including the famous 'Richard the Lionheart's villa at Tivoli,' probably dates from the Conquest, and is the present building of St. Mary's Chapel of St. Mary, from 1464. With

Warwick, Guy of, see Guy of Warwick.

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U.S.A., in Kent co., on Narragansett Bay, with various manufs. Pop. (1910) 26,629. 3. A tn. of Merivale co., Australia, 75 m. S.W. of Brisbane, on Contadamine R., in an agricultural and wine-growing district. There are also gold and coal mines, and quarries of marble and stone. Pop. about 4000.

Warwick, Guy of, see Guy of Warwick.

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Warwickshire, a midland co., England, bounded on the N. by Staffordshire, S. by Gloucestershire and Oxfordshire, E. by the shires of Leice-

ter and Northampton, and W. by Worcestershire. The surface is very variable, though there are no very great elevations, Broom Hill (830 ft.) being the greatest height. The principal rivers are the Avon, with its numerous tributaries, which runs right across the county, the Stour, and the Tame. In the N. is the region that was once Arden Forest, made famous by Shakespeare. The county possesses immense coalfields in the N., ironstone, lime, and cement are also worked. Almost the whole county is under cultivation, pasturage occupying the largest area; dairy farming and market gardening are carried on successfully, and oats and wheat form the main crops. In the N. is the great industrial centre of Birmingham, the principal manufactures being iron goods, hardware, firearms, jewellery, etc. Bicycles, motor cars, watches, and ribbons are manufactured at Coventry and other places. Besides the above-mentioned towns the most important are Leamington, famous for its Spa; Nuneaton; Stratford-on-Avon, famous as the birthplace of Shakespeare; Sutton Coldfield; and Warwick, the county town. The county is divided into four parliamentary divisions, each returning one member. There is a university at Birmingham and an Edward VI. grammar school; Rugby possesses a famous public school, and at Studley Castle is the Lady Warwick Horticultural College for women. The county is famous for its antiquities, Warwick Castle, the residence of the Earl of Warwick, and Kenilworth Castle being the most famous, though there are many others. Coventry church is notable, and there are numerous village churches of interest. There are ruins of a Cistercian monastery at Coombe Abbey near Coventry, besides others at Merevale, Stoneleigh, Maxstone, and Wroxall. Edgehill gave its name to the battle of 1612, in the Civil War. The area of the county is 979 sq. m. Pop. 1,024,196.

Wasatch, see WAHSATCH MOUNTAINS.

Wash, The, an inlet (22 m. by 15 m.) of the North Sea, on the E. coast of England, between Norfolk and Lincoln counties, receiving the Welland, Onse, Nen, and other rivers. Its shores are low and marshy. It is mostly shallow, and contains numerous shoals, its two chief channels being called the 'Deeps' of Boston and Lynn. It is the remnant of a larger bay which once covered much of the bordering Fens. Sea walls now protect the marsh lands. King John lost his baggage and treasure waggons here (1216).

Washburne, Elihu Benjamin (1816-87), an American statesman, born at Livermore. Descended from an old family of English Puritan settlers. In early life followed journalism and teaching. Studied law. Sat in Congress (1853-69) as a Whig, advocating retrenchment. Became Secretary of State under Grant. Went as American ambassador to Paris, and was present during the siege (1870). Left his art and literary treasures to Chicago. He wrote: *Recollections of a Minister to France*, 1887, and a *History of the English Settlement in Edwards County*, 1882.

Washburne, Cadwallader Colden (1818-82), brother of the above, an American soldier, born at Livermore. Worked on his father's farm as a boy. Studied law, proving a successful lawyer and business man. Sat as Whig in Congress (1855-61). Fought for Federal army in Civil War, showing great bravery at Grand Coteau. Founded Washburne Observatory at Wisconsin University, and by his will made other large educational and charitable bequests.

Washing Machines, see LAUNDRIES.

Washington, the cap. of the U.S.A., in the dist. of Columbia, on the l. h. of the Potomac. It was fixed there by an Act of Congress passed in 1790, and the government was transferred thither from Philadelphia in 1800. The city was regularly laid out, according to the design of Major d'Enfant, and now covers an area of more than 10 sq. m. The capitol is the central site. This splendid building stands on a rising ground at the eastern end of Pennsylvania Avenue. It is constructed of freestone and composed of a centre and two wings. A Corinthian portico extends the length of the centre, which is occupied by the rotunda, 96 ft. in height and diameter. The Senate Chamber is in the N. wing. The city has many other magnificent buildings, among which may be briefly named the Patent Office, the General Post Office, the National Observatory, the Concoran Gallery of Art, the Columbian University, and the Howard (coloured) University. The population consists chiefly of government officials and the various professional men and tradespeople required to minister to their wants. Pop. (1910) 331,069. 2. A bor. of Pennsylvania, U.S.A., county seat of Washington co., 25 m. from Pittsburgh. It is a well-built city, the seat of Washington and Jefferson Colleges. It has iron, glass, and carbon works. Pop. (1910) 18,778. 3. A tn. of Indiana, U.S.A., county seat of Daviess co., 110 m. S.W. of Indianapolis. It is the centre of a farming and lumber region. Pop. (1910) 7854. 4. The

county seat of Beaufort co., N. Carolina, U.S.A., on the Pamlico R. It has an extensive trade in farm produce, cereals, and lumber. Pop. (1910) 6211.

Washington, a Pacific state of the U.S.A., was formerly part of Oregon. It is situated in the extreme N.W., bounded N. by British Columbia. It was created a territory in 1853, and in 1889 was admitted to statehood. Area, 66,127 sq. m. Pop. (1910) 1,141,990. The state is traversed from N. to S. by the Cascade Range, whose general altitude is between 6000 and 7000 ft., but there are several volcanic peaks rising above 10,000 ft. In the N.W. is Puget Sound, an inlet with many ramifications, and there are several indentations on the Pacific coast. The Columbia R. flows along part of its S. boundary, entering the state from British Columbia on the N. Its chief affluent is the Snake R., which joins it near South Ainsworth. Lumbering, fishing, and agriculture are the leading occupations, but the mining of gold, silver, and coal is also carried on. There are eighteen Indian reservations in the state, covering an area of 3642 sq. m., the largest being that of Coleville (2031 sq. m.). The cap. is Olympia, and the chief cities are Seattle, Tacoma, Spokane, Bellingham, and Everett. The University of Washington near Seattle has an attendance of over 2000 students.

Washington, a par. of Durham, England, about 6 m. from Sunderland. There are coal mines. Pop. (1911) 4600.

Washington, Booker Tal (1856 or 1858), an American educationalist. Of African descent; born a slave at Hale's Ford, Virginia. With great determination he secured an education at the Hampton Industrial Institute, Virginia, and studied later at Wayland Seminary. Was elected in 1881 to the presidency of the Tuskegee Institute, a college for higher and industrial education for Negroes. His works include *The Negro*, 1909; *Working with the Hand*; by G. H. Pike, 1902.

Working with the Hand; by G. H. Pike, 1902.

Washington, George (1732-99), first president of the U.S.A., born at Bridge's Creek, Virginia. At the age of sixteen he became surveyor of the estates of Lord Fairfax, a member of the House of Burgesses. He joined the army later, and in 1755 Colonel Fry drove the French from Pennsylvania. He was on the staff of General Edward Braddock at the time of his disastrous defeat in 1753. On his marriage he resigned his commission and settled down at Mount Vernon, and managed his wife's large

estates. He was sent as a delegate to both the first and second Continental Congresses, and after the second, he undertook the fortifying of New York. He was chosen unanimously by the colonies to be commander-in-chief of the forces in 1775, when war with Great Britain was declared. He planned the expeditions against Canada, and in 1776 drove the British out of Boston. He proved a very able commander, and disciplined and trained well his troops, a motley crew, mostly citizen volunteers. His fellow-officers resented his friendship with Lafayette, and there were many jealousies and backbitings.

His campaign against the British during the war. Peace concluded. W. returned to Mount Vernon. He took no salary as president. He presided at the Constitutional Convention, May 1787.

when the Constitution of the U.S.A. was formed and was naturally elected as first president on the union of the original thirteen states a few months later. He made a good president, and was re-elected after the first four years. He absolutely refused to stand for a third term, thus creating a precedent. He paid official visits to New England, 1789 and 1790, but was essentially a true Southerner. He was a Federalist, and during his second presidency became unpopular with the Democratic republicans. He was opposed, too, by his Treaty of Commerce with France, the attacks of which and omity of former political friends embittered his last years.

He died at Mount Vernon, Va. He was a man of great energy, and he had a high sense of duty, and though he was a Southerner, he was a true American. He was a Judge of the Supreme Court, and at the time of his death spoke of him as the greatest American. He was first in peace, and first in the hearts of his countrymen. He holds a unique place in the history of the Republic, which owes to him its very existence.

He put down the Whiskey political intrigue, with a high hand, and the people began to fear a military despotism. He alone of his contemporaries realised the greatness of the nation he was

Washington, Mount, culminating in the White Mts., in the Presidential Range, Coos co., New Hampshire, U.S.A., 75 m. N.E. of Concord. It is 6293 ft. high and ascended by a railway (1869) and a carriage road. Tuckerman's Ravine is a deep gorge in the S.E.

Washington, Treaties of: 1. That made in 1846 with Great Britain by which the boundary W. of the Rocky Mts. was established. 2. That made in 1854 with Great Britain relative to fisheries, duties, and navigation in British N. America, often called the 'Reciprocity' Treaty. 3. That made in 1871 with Great Britain for the settlement of all causes of difference. Under its terms the *Alabama* claims, the San Juan boundaries, and certain fisheries disputes were settled by arbitration. This treaty further laid down the following rules: That it is the duty of a neutral state, which desires to remain at peace with belligerents, and to enjoy the rights of neutrality, to abstain from participating in the war, and to see that no acts be committed by any one in the territory which would constitute co-operation in the war.

Washington Court-House, the cap. of Fayette co., Ohio, U.S.A., on Sugar (Point) Creek, 40 m. S.W. of Columbus, an important railway centre. It has a poultry packing house, and manufs. of furniture, stoves, soap, etc. Pop. about (1910) 7277.

Washita, *see* OUACHITA.

Wasmes, a com. of Hainault prov., Belgium, 6 m. W.N.W. of Mons, with coal mines and industrial activities. Pop. 16,000.

Wasp, a name given to various hymenopterous insects. The Vespidae or true Ws. are distributed throughout the world, though most numerous in the tropics. A characteristic feature is the longitudinal folding of the wings when at rest. The social Ws. (Vespinæ), which form a sub-family, almost all employ undeveloped females for workers. The community is of seasonal duration only; the mother or queen, after hiding during the winter, emerges in the early spring and starts to build a nest of paper worked up with her mandibles from vegetable substances. She constructs six or eight six-sided cells and in them lays eggs from which grubs quickly hatch. They are fed on honey and insects, and when full-grown the cells are sealed up and the larvæ change into pupæ and again into young workers. These continue the construction of the nest and the care of the young, leaving the queen to devote herself chiefly to egg laying until the nest contains some hundred inmates. Not until the end of the season are drones and fully-developed females produced. These leave the nest, and, after pairing, the females seek shelter for the winter. It is the destruction of the queen Ws. in early spring by cold weather and human agency that checks the numbers of Ws., but while they are undeniably

serious enemies of the fruit-grower, they destroy great numbers of other insects. The other sub-family of the Vespidae is the Euminae (solitary Ws.), which usually make earthen nests, capturing and storing insects as food. All the females are fully developed, and, although there are no social communities, a stage in the development of communal life is seen in certain species, which build their cells close together. There are three hymenopterous families of digging Ws.: the Scollidae, the females of which search for beetles' larvæ in the ground, paralyse them with their sting, and lay an egg on the body; the Pompilidae, which construct their nests in sandy banks, capturing spiders to feed their grubs; and the Sphegidae, which make nests in the ground or in wood and capture insects to furnish food for their larvæ.

Wassail (A.-S. *wæs* and *hal*, be thou whole, of good health), originally an expression of good wishes at festivities, especially a 'toasting' or salutation in drinking. Later it was used for a drinking-bout or carouse, and then for the beverage used (especially at Christmas and New Year). This consisted of spiced ale (or wine), sweetened, and flavoured with cinnamon, cloves, roasted apples, toast, etc. It is sometimes called 'lamb's wool.'

Waste, in law a term denoting any spoil or destruction done or permitted by the tenant to houses, woods, lands, or other corporeal hereditaments (*q.v.*) during the continuance of his particular estate (*q.v.*) therein. W. is said to be either (a) *voluntary*, i.e. acts of commission, such as pulling down buildings, felling timber, opening mines, etc.; (b) *permissive*, i.e. acts of omission such as non-repair of buildings—a tenant for life is only liable for such W. if the duty to repair has been expressly cast upon him by the settlement—and (c) *equitable*, or as it has been called 'malicious or humourous' W., as by destruction of the family mansion or pictures. A tenant for life even though expressly declared by the settlement to be 'not impeachable' for W. is nevertheless liable for equitable W. The remedy for W. is by action for damages and injunction (*q.v.*).

Waste Lands, *see* RECLAMATION OF LAND.

Waste Products, *see* REFUSE, DISPOSAL OF.

Wast Water, a small lake of St. Bees par., Cumberland, England, 11 m. from Keswick, drained by the Irt into the Irish Sea. It is 3 m. long, averaging 650 yds. in width.

Watch, *see* HOROLOGY—*Watches*.

Watch, on board-ship, a division of

continent being formed of horizontal strata. W. have been used to generate power by means of water-wheels for centuries past; turbines are replacing them, and are particularly used for generating electricity by turning dynamos. The effect, industrially, of this is very great. Factories are migrating from regions near the Alps to the foot of them, and countries without coal but with W. are establishing

ra Falls is it, and a was promoted in 1906 to supply power from the Victoria Falls.

Waterford: 1. A co. in the prov. of Munster, Ireland, bounded on the N. by Kilkenny and Tipperary, S. by the Atlantic, E. by Waterford Harbour and Wexford, and W. by Cork. The coastline is much indented, the principal inlets being Ardmore Bay, Ardmore Bay, The districts t mountains, the chief ranges being the Comeragh and Monavallagh Mts. (2597).

(2605 ft.)

in the S.W. The principal rivers are the Suir and the Blackwater, famous for the salmon fishing. Agriculture is successfully carried on, but the greatest area is under pasturage, and the rearing of livestock is increasing; the principal crops are oats, potatoes, and turnips. The fisheries form one of the chief industries, cotton is manufactured, and there are breweries, distilleries, and flour mills. Marble and copper are found. The chief towns are W., Dungarvan, and Lismore. The county comprises eight baronies and returns two members to parliament. W. was originally inhabited by the Danes, of whom there are numerous relics. At Lismore there is an old castle, at Ardmore 7th century monastic remains and a holy well, and at Mulleray there is a Trappist monastery (1830). Area 717 sq. m. Pop. (1911) 83,766. 2. A municipal, parl., and co. bor. and city, cap. of co. Waterford, Ireland. It is situated on the R. Suir, 94 m. S.W. of Dublin (111 m. by rail). A wooden bridge with thirty-nine arches connects it with the suburb of Ferrybank on the N. bank of the river. It contains Protestant and Roman Catholic cathedrals, to the former belong a deanery and in connect training hall, law courts, and barracks. Remains of the old city walls remain, notably, Reginald's Tower dating from the 11th century. A large export trade is carried on, especially in

bacon and butter. The harbour is formed by the estuary of the Suir and Barrow. There is steamer communication with Fishguard, Glasgow, Liverpool, Bristol, etc., besides the other Irish ports, among which it ranks second. W. was wrested from the Danes by Strongbow in 1171, Prince John landed there in 1185, and afterwards as king in 1210. Richard II. landed there in 1391 and 1392. James II. sailed from there to France after the Battle of the Boyne, and William sailed from there to England. During the Civil War it was taken by Ireton. It received its first charter from King John in 1206. Pop. (1911) 27,430. It returns one member to parliament.

Waterford, Louisa, Marchioness of (1818-91), an English artist and book-illustrator, daughter of Lord Stuart de Rothesay. She married the third Marquis of W. Ford Castle in Northumberland contains many of her finest works, such as 'Spring,' 'Christmas,' 'The Miracle of Healing the Two Blind Men,' which were highly praised by Watts. Many of her drawings were exhibited (1892). See Hare, *Two Noble Lives*, 1893.

Water-gauge, an instrument for measuring the height of water. The commonest form is that fixed to the front of boilers, consisting of a perpendicular glass tube, communicating at the upper end with the steam space of the boiler and at the lower end with the water in the boiler.

Water Glass, see SOLUTION: GLASS.

Water Hemlock, Cowbane, or *Cicuta virosa*, a tall umbelliferous perennial, growing in damp places, bearing large umbels of white flowers. Its poisonous turnip-shaped root has frequently been eaten, with fatal results.

Water-Hen, see MOORHEN.

Waterland, Daniel (1683-1740), an English theologian and controversialist, studied at Cambridge from 1699. The Earl of Surrey was his patron. W. became canon of Windsor (1727), archdeacon of Middlesex and vicar of Twickenham (1730). His principal works were on the great Arian controversy, and he was considered to have extinguished Arianism. He proved the fact among his publications (1719-23) and the

Further Defence in answer to S. Clarke (1725); *Scripture Indicated* in answer to Tyndal (1734) and *Review of the Eucharist*, 1737. See Van Mildert's ed. of his *Works* with *Memoir* (1823-28).

Water-Lily, the name given to the various species of *Nymphaea* and *Nuphar* and also of *Nelumbium*, all

belonging to the natural order Nymphaeaceae. Britain produces white and yellow W.-ls., which are found floating in still waters. See Conrad, *Water-Lilies*, 1905.

Waterloo, a vil. situated a few miles S. of Brussels, chosen by the Duke of Wellington, from its strategic position relatively to the line of fortresses on the N.E. frontier of France, as the most advantageous place to resist the advance of Napoleon on the Belgian capital. The outstanding features of this battle were the extraordinary and long-continued resistance of the British infantry to the unremitting cannonade of the French artillery, the dramatic arrival of Blücher and Bülow with three corps of the Prussian army, and the routing of Napoleon's celebrated 'Old Guard' under Ney. Creasy gives the following figures of the respective strengths of the two armies: Wellington, 49,608 infantry, 12,402 cavalry, 5645 artillery with 156 guns (of which total scarcely 24,000 were British); Napoleon, 48,950 infantry, 15,765 cavalry, 7232 artillery with 246 guns (comprising 'the flower of the national forces of France'). The British occupied a position facing W., and across the main routes from Brussels to Charleroi and Nivelles. The central body held the building and gardens of Hougomont, the left centre the farm of La Haye Sainte. Napoleon concentrated his army on a low range of hills facing the British position, and after despatching a corps to watch the Prussian advances he began the action with a fierce attack upon Hougomont. Throughout the day he sent column after column of infantry to the point, strengthened his attack with repeated cavalry charges, and all through maintained a terrific artillery fire; but the British infantry, under the indomitable Picton, in spite of the treachery and poltroonery of the Dutch and Belgian allies, held out to the end of the day, and in the course of this heroic resistance, the Union Cavalry Brigade of British Royals, Scots Greys, and Irish Inniskillings galloped out. They rendered seventy-four of Ney's guns useless for the rest of the day. Napoleon took La Haye Sainte late in the day, but only when Blücher and Bülow were pressing his right. This divided his attentions between offensive and defensive, and he was obliged to send out the Young Guard to occupy Planchenoit village, the defence of which had become absolutely vital to the safety of the French. But the battle was over from this time, for other Prussian forces were constantly appearing nearer and nearer to the English left near Papelotte and from

St. Lamherth. As a last resort Napoleon endeavoured in vain to break the British line with the Old Guard under Ney; Wellington then took the offensive, advanced with his whole army, and sent the French flying from the field. The losses were enormous: British, 15,000 killed and wounded; Prussians, 7000; French, unknown.

Waterloo: 1. The cap. of Black Hawk co., Iowa, U.S.A., on Cedar R., 52 m. from Cedar Rapids, 6 m. from Cedar Falls. Agriculture, dairying, and poultry-raising are the chief pursuits. There are foundries, canning and packing industries, and various manufactures. Pop. (1910) 26,693. 2. A municipality of New South Wales, Australia, a suburb of Sydney (2½ m. distant). Pop. 10,000.

Waterloo (or Waterloo) Antoni (or Anthonie) (c. 1609-c. 1676), a Dutch landscape-painter. Houbraken praised his clear skies and rich, varied foliage, but his pictures were unsigned, and those attributed to him are rare. The museums of Amsterdam and Rotterdam and Stuttgart Gallery contain examples of his work, but he is best known for his clever etchings. Weenix painted figures for his pictures.

Waterloo Cup, *See* COURSING. Waterloo-with-Seaforth, a tn. and watering place of Lancashire (S.W. coast), England, on the Irish Sea, at the Mersey's mouth, a residential suburb (N.W.) of Liverpool (5 m. distant). Pop. (1911) 26,399.

Waterman, one who conveys passengers for hire in a boat on a river. The only large body of W. in England are those employed on the Thames at London. Before the introduction of coaches the Thames was the great highway. The W. or lightermen are an incorporated company, founded 1556.

Water-meadows. Pasture is much improved by the application of water to meadows, as is found in the case of those which are periodically flooded. In many cases along the Thames, and in Dorset, Wilts, and Devonshire, flood waters can be regulated, while in others actual irrigation is established. Sluices and channels are arranged and controlled so that water may be drawn from the river passed over meadows and discharged again into the river later. The meadows thus treated are valuable, as they provide excellent early spring pasture for young animals, hay about the end of June, and autumn pasture for cattle. At these times the meadows are kept dry, but during the rest of the year they are usually flooded every other week.

Water Measurements. In civil engineering the unit is the gallon.

The contents of a bank or reservoir are calculated in cubic feet and multiplied by 6.2355. In estimating rainfall inches are used, these merely expressing the depth attained over the area of rainfall if the surface were level, confined, and impervious.

In the U.S.A. the acre-foot is the unit for irrigation purposes; this is 43,560

cub. ft., or 271,618 gals. imperial.

The U.S.A. gal. = 83 imperial gal.

It is convenient to measure water by its flow in open channels and pipes.

Open Channels.—A simple formula for mean velocity of flow is $V = \sqrt{2g/m} \times \sqrt{r_i}$, $g = 32.2$ ft. per sec.,

r_i = hydraulic mean depth, which is the area of cross-section of water in square feet divided by the wetted perimeter in linear feet; i = the sine of the angle of inclination of flow; m a varying factor containing all the modifying factors. The velocity, cross-section and time being observed, the amount of discharge in a given time is easily determined. Cubic feet per minute $\times 9000$ = approximately gallons per day. In taking account of various factors, such as roughness of material used, various empirical formulae are used. D'Arcy's, a modification of Bazin's, is a simple practical one:

... Kutter's

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used an

factor supplied in tables and giving the nature of the surface; it varies from .009 for well planned timber to .05 to rough natural water courses. A discharge 60 per cent. greater than in an ordinary earth channel may be obtained by using a cement surface. In gauging stream velocities, a float such as a bottle may be timed over a given distance, a mean result from several tests being taken; another method is to distribute floats over the surface, determine the mean over a given distance, and multiply by 0.8. From the former central line surface velocity V , the mean cross-sectional velocity may be obtained by multiplying by a factor varying from .780 to .920; the factor may be obtained from tables. A better form of float is a weighted rod, so devised as to reach within a few inches of the bottom. Current meters are also used; these are practically screw propellers with a recording device to count revolutions, the propeller being composed of conically-shaped cups. By drawing the meter through still water it may be rated. In small streams a dam may be arranged with a pipe, water being collected in a vessel for a certain time and then measured. A measuring vessel is often arranged in a pipe leading from a reservoir; ordinarily

the flow is uninterrupted through the vessel, but it may be stopped by a valve, and the time taken in filling

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one-fifth that of the stream; and the depth of water at the crest should not be less than 5 in.; the discharge is calculated by formula from measurements. As there is a fall in the surface of the water, gauge posts are placed a little up-stream; for accurate work a hook is so arranged that it may be placed, by means of a screw, with its point at the surface of the water; it is attached to a sliding rule from which the height of water from the bottom may be read. The module is a form of measuring weir, through which water for irrigation is discharged to a consumer, the amount used being calculated by formula. For a rectangular notch Francis' formula is used: $Q = 3.33 (L - 0.1nh) h^{3/2}$; Q being cubic feet per second flow; L length of crest in feet; h , depth of water in feet; n , a constant. If the crest is the full width of the channel the formula becomes $Q = 3.33 L h^{3/2}$. For the right-angled V notch, $Q = 2.54 h^{3/2}$. Instead of notches, orifices are often used; they are generally circular or rectangular, but are only used for small constant discharges. The formula is $Q = 3.9 d^2 \sqrt{h}$, when h is the 'head' measured from the centre of the orifice; d is the diameter. Yet another method of measuring velocity and thence flow is by means of Pitot tubes; these are tubes bent at right angles, the horizontal arm being held facing up stream, when the rise of water due to pressure is noted in the vertical arm. **Flow in pipes.**—The formulae are practically the same as for open channels with modifications for friction. It is important if calculations are to be relied on that the pipes shall be laid correctly so that air cannot accumulate in bends; the alignment should be as straight as possible. The simplest formula is $V = \sqrt{4gh/3}$; it is necessary to note carefully the head of water in this case, as it may be variable, and at a distance away as in reservoirs. Chezy's modification of Kutter's formula is $V = C/\sqrt{r_i}$; this is for clean pipes. If, however, the water is under pressure, it is usual to use meters. One of the simplest forms of water-meter is a form of turbine, the rotations being automatically recorded on a dial. They are thoroughly good for large flows, but when pres-

sure diminishes there is a leakage of water passed through the turbine without producing rotations. If the water is being pumped through the pipe, the discharge can be calculated from the pump. The *Venturi-meter*, invented by C. Herschel, consists of two funnel-shaped sections, of different tapers, forming a constriction in the pipe. The differences of pressure due to friction in passing through the throat of the pipe is measured, the pressure being less at the constriction than at the up-stream end. A device for registering these pressures is arranged and from its records the amount of flow is shown. There is practically no loss of head, as found in other meters. *Positive meters* are the only really reliable form. In these the flow is controlled by a valve which causes the water to pass alternately through two chambers of known dimensions. As soon as one is full the water is turned into the other, the full one supplying the discharge pipe. The number of times these are filled is recorded on a dial. *Palre meters* are simply an arrangement of a valve which opens to different amounts with the varying flow; the amount of opening is recorded by a pencil and drum. From this record the flow may be calculated, but they are generally used as waste-water indicators, to show variations only in flow. See Hennel's *Hydraulic and other Tables* (2nd ed.), 1901; Neville, *Hydraulic Tables*, 1875; Brightmore, *Principles of Water-works Engineering* (3rd ed.), 1905; Welsbach and Du Bois, *Hydraulics and Hydraulic Motors*, 1889; Hoyt and Grover, *River Discharge*, 1907; E. C. Murphy, *Accuracy of Stream Measurements*, U.S. Geol. Survey, Water Supply Paper No. 94, 1904.

Water Melon, or *Citrullus Vulgaris*, a plant (ord. Cucurbitaceae, with yellow flowers followed by large round fruits which are cultivated in tropical countries and sometimes grown in greenhouses in Britain.

Water on the Brain, see HYDROCEPHALUS.

Water-Ousel, see DIPPER.

Water Plants, see AQUATIC PLANTS.

Water Polo, a game played in the water, a large swimming bath being generally used. The distance between the goals may vary from 19-30 yds., the width of the course must not exceed 20 yds., goals must be 10 ft. across and 3 ft. high above the surface in a depth of 5 ft. or more of water, 8 ft. high from the bottom in shallower water. A large ball, like a football, is used; there are seven players each side and a match lasts fourteen minutes, seven minutes each way. There are many rules, and at

least eleven ways of committing a 'foul.' There are over 600 English clubs, and the organised sport is controlled by the Amateur Swimming Association.

Waterproof Composition. In 1835 Mr. Helliwell of Salford patented a method of rendering cotton and other fabrics waterproof on immersion in a solution of rock alum and whitening in water, and afterwards treating with soap and water. Mr. Hall of Doncaster, 1839, used a solution of alum, white lead, and water, sometimes adding acetic acid; the cloth after immersion was passed through lime-water and afterwards through a solution of boiled Irish moss. A composition for tarpaulins, etc., was formed of linseed oil and pipe-clay chiefly, with the addition of white lead, burnt amber, and pumice stone. Macintosh material is made by applying several layers of a benzol or coal naphtha solution of rubber to the fabric, sulphur being added for the purpose of vulcanising by steam heat. The material is then rolled. If stronger fabric is required, two or more pieces of prepared fabric are rolled together so that the rubber faces incorporate. Sulphur is not used with finer fabrics, such as those of wool or cotton; they are exposed to the vapour of sulphur chloride, or dipped in a solution of the chloride in carbon bisulphide, heat not being employed. For coarser and tougher fabrics, paste, glue, and treacle are incorporated together with various pigments. When leather is rendered waterproof in such a manner a layer of varnish is often added as a coat before heating. Linseed oil is used as a basis chiefly in materials which will not be folded, but the substance becomes brittle with age. A company has been floated for producing waterproof material of all kinds in which weight is largely reduced; at present all compositions are over heavy.

Water-Rail, see RAIL.

Water-Scorpion, see WATER-BUGS.

Watershed, Water-parting, or Divide, in physical geography, the whole region which is drained by or contributes to the supply of a river or lake. Also the line of separation between the basins of two adjacent rivers, lakes, or drainage-valleys, or the natural boundary of a basin, from which streams flow in opposite directions.

Waterside: 1. A vil. of Ayrshire, Scotland, on the Doon, 8½ m. from Maybole. Pop. (1911) 1400. 2. A suburb of Londonderry, Ireland, on the E. side of the Foyle, N.W. of Londonderry co.

Water-softening. Hardness of water is due to the presence of cal-

cium sulphate, and the bicarbonate of calcium and magnesium; in consequence they do not lather with soap, which is decomposed and insoluble salts of Ca and Mg are formed with the fatty acids. In addition the formation of 'fur' or scale in boilers and kettles by deposition of insoluble matters The reaction the

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 a lime in suffi-
 cient to precipitate
 etc. This does

not remove the sulphate; for this purpose sodium carbonate is added. The Ca being precipitated as carbonate, the sodium sulphate formed being soluble and innocuous. It is usual to supply the lime in defect rather than in excess, though a slight excess is claimed to have bactericidal effect. Commercially the process is carried out in its simplest form by Clark's Process, the whole being managed in tanks from which the clear water is drawn off after settlement of precipitate. In other cases, such as Porter's, filtering is resorted to, and in yet other processes the methods are combined. Sedimentation is also hastened and rendered more complete by allowing the fluid to pass through tanks and pipes with shelves and baffle plates inserted; these are arranged for easy removal and cleaning. The chief point is to diminish the velocity of flow, and to arrange for taking off as far as possible surface water only. The Braun-Löwenher system supplies hard water from a tank which tips out the contents automatically into the softening tank, the required chemicals being admitted at the same time. The movement also controls valves which allow the softened water to flow into a receiver for storage. Hardness of water is measured in degrees. It is tested by shaking with standard soap solution; or any soap solution, in which case standard solution of carbonate of lime is similarly agitated and the results compared.

Water-Soldier, see STRATIOTES.

Water-Spaniel, see SPANIELS.

Waterspout. A W. appears as a conical mass with concave sides rising from the water surface to meet by a prolongation of its apex a smaller but inverted cone of cloud. The cylindrical joining portion has an unsteady undulatory motion, and the whole W. pursues an irregular path. The conditions for formation appear to be a whirlwind occurring over the sea or a large lake during the prevalence of a humid atmosphere. The rise of heated air is accompanied by rushing wind, which lashes up the water into waves,

and the foam and spindrift is carried upwards; it is possible that with the rapid expansion of rising air and the vortex motion very low pressure occurs in the central axis and cold air from above descends; but the mere expansion and expiration of the movement in the upper portion would cause cloud formation. Cloud, in fact, forms most of the system, and a cloud burst on land is the counterpart of the W. at sea. Torrents of water, rather than rain, result. Fish and frogs have been carried inland by such phenomena.

Water Supply, in a scientific sense, is a problem connected only with towns or closely populated regions. *Rural supply.*—In sparsely populated and undeveloped regions, natural sources such as springs or streams are relied on, and purity is sufficiently assured, except when storage is necessary on account of recurring drought. To save portage wells have always been and still are in common use. These may be classified as *dipping* and *draw wells* in the majority of cases, and it may be noted that they are the most dangerous, as well as containing the hardest water. If the water-table lies at a fair depth from the surface they may be looked upon as stores of filtered water. They are obviously open to pollution from surface water off manured lands and other sources; organic matter, ammonia, nitrates, chlorine, and even nitrites are common impurities. Draw wells may be considered to reach a depth of 20 ft. Both types are to be condemned as drawing their water from surface areas overlying impervious strata. *Deep wells* are those containing water from below such strata, and usually from a distance. They may be quite satisfactory, particularly if properly enclosed at the surface and drawn by means of a pump. *Artesian wells* form one of the best sources of supply and in the colonies as well as in towns in the old countries they are becoming much more numerous. Such waters are obtained from a great distance, usually upland, and below several layers of impervious strata; they are therefore of great purity except when brackish or salt or warm. They are, however, free from organic matter, though the water is often objectionably hard. A surface well properly excavated, lined, and fitted with a pump may cost from £10 to £16; a deep well of a simple and easily bored type (100 ft.) about £50; the latter might supply a population of 150 to 200. Artesian wells are extremely variable in cost and supply. It may here be noted that the Rivers Pollution Commissioners classify drinking water as follows:

1. According to palatability and wholesomeness :—

Wholesome	1. Spring water	} very palatable
	2. Deep well water	
	3. Upland surface water	
Suspicious	4. Stored rain water	} moderately palatable
	5. Surface water from cultivated land	
Dangerous	6. River water to which sewage gains access	} palatable
	7. Shallow well water	

2. According to softness :—

1. Rain water
2. Upland surface water
3. Surface water from cultivated land
4. Polluted river water.
5. Spring water
6. Deep well water
7. Shallow well water

Properly collected and filtered rain water may be considered good, but the precautions are naturally numerous and not often observed. It is important, if obtained from roofs, that the first washings of rain should not be collected in the tank, and in any case the barrel form of storage should not be used.

The cost of pumping 1000 gallons of water to a height of 100 ft. is comparatively shown as follows:

1. Hand labour at 18s. per week	d.
2. Horse power, man at 18s. per week	26.5
3. Gas engine and pump (gas 4s. per 1000)	4.20
4. Small steam pump and boiler (coal £1 per ton)	1.44
5. Oil engine and pump (oil 7d. per gall.)	0.75
6. Electrically driven pump in connection with large steam plant for lighting	0.70
	0.45

Cheaper than any of these comes the American type of windmill, but arrangement for storage is generally a somewhat added cost. Where pipes lead from the pump to tanks, the former should be of cast iron, with spigot and socket ends and joints of yarn and blue lead; tanks are usually of cast or wrought iron and galvanised, but special paint should be applied in addition. The hydraulic ram is largely in use for supplying water from streams and ponds; it is automatic, durable, and extremely economical. In England the water supply of rural districts is regulated by the Public Health Act, 1875, and the Public Health Water Act, 1878, the supply being under the authority of the rural sanitary authority, who have very full powers, including that of declaring a house unfit to habit if

no supply is available. The distribution of water in the strata of England may be generalised as follows: The clays, gault, Upper Lias, and New Red Marl are non-water bearing; limited supplies are obtained from Purbeck Beds and Lower Lias; from the gravels, crags, and sands the water is subject to pollution and often contains iron, but good supplies are obtainable from the Reading Beds and Thanet sands. Chalk, Upper and Lower Greensand, afford a practically unlimited supply of good, pure, but hard water, which applies also to calcareous grit, oolites, magnesian limestone, and mountain limestone. Good supplies are obtained from Portland rock, Middle Lias, New Red Sandstone, Old Red Sandstone, slate, and granite. Millstone Grit gives excellent water in abundance; the coal measures abundance, but often of bad quality.

Town Supply.—When the supply required is large and the district extensive and uneven larger provision than that of wells is necessary. The water may be taken by means of pumps from a river near by, or obtained from a distance, usually an upland surface region. In such cases provision must be made for pressure in order to supply not only the upper stories of houses, but also houses situated on elevated sites. This may be developed by force pumps which supply water to a tower situated above the highest part of the supply pipes. Such a tower maintains a constant 'head' of water and gives pressure if the pumps are intermittently worked; a reservoir may be constructed at such a height for storage and pressure. Such arrangements are becoming less common, reliance being placed entirely on pumping. *Gravitation* may be used for giving pressure when the water is drawn from upland surface regions,

storage tanks being arranged in the course of the system at convenient and sufficient heights. In such a system, such as is being adopted steadily by larger industrial areas—e.g. Liverpool from Lake Vyrnwy; Manchester from Longderdale valley and Lake Thirlmere; Glasgow from Loch Katrine—water is brought in open aqueducts, tunnels, and pipes from the gathering ground where it is stored in large reservoirs, usually constructed by building a dam across a valley. Along the course compensation water is given out to streams whose head supplies have been tapped. On nearing the town, a high-level reservoir is generally constructed, from which the water is drawn through the filter beds to the covered clear water tank which feeds the supply pipes direct. The water may be at great pressure when brought from mountains to the coastal plain, and in low-lying districts it might necessitate the uneconomical use of stronger pipes. To obviate this a special 'break' reservoir at a convenient height may be fed, which gives its water at less pressure. Subsidiary supplies may also be drawn from other sources near at hand.

Quantities.—The amount of water required is estimated in gallons per head per day; in England it is found to be anything from 20 to 50; in America somewhat more. Mr. Freeman of New York estimates 31 to 56 gallons used, 10 unavoidably wasted, and from 50 to 75 avoidably wasted. In Philadelphia 30 gallons were used and 192 wasted. The waste may be due to leakage for the most part. The amount used, of course, varies with the time of day and with the season. The uses may be summed up as follows: Drinking (first, because it necessitates the great expense of purification), sanitation and washing, street and garden watering and fire extinguishing; power, though on account of great expense factories usually instal their own supply. The amounts and their fluctuations, together with good provisions for increased population, extended area, and increased use, necessitates careful estimation in all parts, pumping machinery, reservoirs, diameters of pipes, etc. They are of prime importance in deciding the area of collection at the head.

Rainfall.—Not only is this to be measured regularly for average and for drought, but it must be traced in its distribution. The discharge of streams, loss by evaporation, and by underground drainage are in England, 10 per cent. and provision for storing a supply for five or

six months is generally made. Account must be taken of compensation water claimed by factories, riparian owners etc., and reckoned usually at one third the discharge of the stream. This is arranged definitely when powers are obtained from parliament and sometimes necessitates the construction of special reservoirs, not always a disadvantage for they take flood-waters. When water is obtained from rivers the habit of the stream must be studied.

Intakes.—Valve towers are erected in reservoirs and lakes; in the case of rivers, the supply may be brought by a parallel channel from upper reaches to a lateral reservoir; more often tunnels are built in a masonry wall, which lead to the reservoir; sometimes a natural or artificial portion of the bank forms a first filter bed, the water being allowed to percolate through. If the head waters are collected at numerous springs, they are usually enclosed and connected by pipes to a reservoir or well whence the water flows into the pipes. When water is pumped from a river, the times are chosen when the water is at its best.

Conduits, Pipes, etc.—The former are preferably used, unless the volume is too small to justify expense, and they are usually open. Tunnels are used when, for any reason, purity may be endangered. Pipes are resorted to for straighter course, or when the level becomes low and pressure greater, as when a valley is crossed, or when a break in the gradient is advisable.

Purification.—The waters having been collected they must be freed from impurities both inorganic and organic. For the former sedimentation is relied on chiefly, and when too hard, the process of softening takes place at the same time, the necessary quantity of calcium and sodium carbonate being run in. This is usually carried out in separate reservoirs or beds of shallower proportions, and divided into portions which may be used in rotation. Much organic matter is carried down, and with it bacteria, the process of filtration being partly relieved. The filter beds are contained in water-tight tanks with drainage channels leading from gratings in the floor. To prevent clogging these gratings are covered with heaps of gravel and fine sand laid level over all. Water is run in slowly and percolates through, the organic matter forming a slime on the surface. The sand is simply a mechanical support and collecting area for the impurities, its depth being, as a rule, about 2 ft. The bacteria in these are already at work, and the water being shallow,

2 or 3 ft. above the sand, their activity is greater. It is the layer in which they are active that forms the real filter. As this becomes clogged another bed is brought into use, and the sand scraped off the surface to be used again after drying and aerating. Filtering is allowed to proceed as slowly as possible, but the rate is contingent on the area available and the demand for water. The reduction in organism in the case of filtering of Thames waters amounts to 97.7 on the average, depending on the thickness of the sand layer and slowness of the process. In America, aluminium sulphate is often added, the effect of which is to aid coagulation of the organic slime, and the water is then forced through the beds at a greatly increased rate, but the resultant water is less free from bacteria. In some cases again the sand bed is given a prolonged life by covering with coarse gravel, so as to lessen also the time of recovery; filtration being no better. From the filter beds the water proceeds to the *clear water tanks* from which it is passed into the mains. These are of stone, brick, or concrete, and often covered, when there is danger of contamination from dust, smoke, and fumes of towns. The roof is usually of iron supported on pillars. Ventilation is arranged and the means of cleansing. To prevent heating during the day and in summer, clay foundations are placed under the concrete or brick and round the side, the whole being covered with earth. The size of the service reservoir, as it is called, is adjusted to the varying demand. As in the case of the inlet valve and the reservoir the outlet pipe of the service reservoir is covered with copper gauze as a strainer.

Distribution.—There is no rule for arranging the diameter of mains and pipes, beyond the one that they have to carry a day's supply practically during 8 to 12 hours of daylight. The water is distributed through a system terminating in the leaden pipes within the houses. Along the course are placed air valves, where air is likely to accumulate owing to bends, scum valves for cleaning purposes, stop valves, reducing valves, the hydrants for use in street-watering and in case of fire, the waste water meters, and trade supply meters. Scouring is performed by opening the scum valves and allowing the water under pressure to waste. The mains and street pipes are laid well below the surface where they are free from summer heat and winter frost, as well as from damage by heavy traffic. Leakage, however, accounts for some 6 per cent. of the local water supplied. Many large towns are taking over their

water supply as a trading concern (see MUNICIPAL TRADE). The question of water supply in many countries is largely connected with IRRIGATION (q.v.), and the steady development of water power for producing electrical energy. See also RESERVOIRS, RIVERS, SEWAGE, PUMPS, RAINFALL.

See Burton, *Water Supply*. 1898; J. Tillmans, *Water Purification and Sewage Disposal*, 1913; C. Herschel reprint trans. and notes of *The Two Books on the Water Supply of the City of Rome of Sextus Julius Frontinus*, ed. 1913; C. J. R. Maclean, *Rural Water Supplies*; Merryweather and Sons, *Water Supply to Estates and Villages*. Water-tight Compartments, see SHIPBUILDING.

Watertown: 1. A tn. of Middlesex co., Massachusetts, U.S.A., on Charles R., residential suburb of Boston, 6 m. W. There is a national arsenal; manufs. include rubber, paper, woollen goods, stoves, starch, and horses and cattle are reared. W. was founded about 1630, since when much of its territory has been absorbed by Cambridge. Pop. (1910) 12,875. See *Hist. Sketch of Watertown* by Francis (1830), Whitney (1906). 2. City of Dodge and Jefferson counties, Wisconsin, U.S.A., on Rock R., 44 m. W.N.W. of Milwaukee. The North-western (Lutheran) University (1865) and the Sacred Heart (Roman Catholic) College (1872) are here. Dairy and apiary supplies, flour, machinery, and bricks are produced. Pop. (1910) 8829. 3. Cap. of Codington co., S. Dakota, U.S.A., 100 m. W. by N. of Sioux Falls. It is in a farming district; has breweries, grain warehouses, lumber interests, and manufs. agricultural implements. Pop. (1910) 7010. 4. Cap. of Jefferson co., New York, U.S.A., on Black R., 47 m. from Oswego. It has a state armoury, and manufs. of paper, wood-pulp, steam engines, vehicles, cheese, and other farm and dairy produce. Pop. (1910) 26,730.

Waterville, a tn. of Kennebec co., Maine, U.S.A., on the Kennebec, 17 m. N.N.E. of Augusta. Fine water-power is supplied by the Ticonic Falls. Colby Baptist College (Waterville College, 1820) and the Coburn Classical Institute are here. Cottons, woollens, machinery, paper, and furniture are manufactured. Pop. (1910) 11,458.

Water Violet, an aquatic plant of the genus *Hottonia* (order Primulaceæ). It bears whorls of pale purplish or yellow flowers, resembling the stock gillyflower once called 'violet,' and pinnatifid leaves. It is also called feather-foil or water-feather. *H. palustris* is the kind commonly found in ponds.

Watson-Gordon, Sir John (1788-31), a portrait-painter, born in Edinburgh. He was trained for the

Watson, George (1767-1837), a Scottish portrait painter. He studied art under Reynolds, and afterwards settled in Edinburgh. Here his eminent gifts were rather shadowed by those of his great contemporary, Raeburn, yet W.'s popularity as a man is ovineed by the fact that whou

army, but abandoned a military career for art. He studied exclusively in Scotland, and in 1808 produced a scene from the *Lay of the Last Minstrel* for the first public exhibition held in Edinburgh. This he followed by various historical and religious pictures, but he soon turned to portraiture, of which he became the leading painter in Scotland. He painted most of the Scottish celebrities of his time, including Sir Walter Scott, and also many distinguished Englishmen, e.g., David Cox. He became R.A. in 1851.

Watson's Bay, a popular resort in New South Wales, on the shore of Port Jackson, 7 m. E.N.E. of Sydney. Pop. about 1500.

Watt, the practical unit of electrical power, and the power obtained when a current of 1 ampère is conveyed through a difference of potential of 1 volt. The number of watts is obtained from the products of the number of volts and ampères operating. Thus $\text{watts} = E \times C$. It is equal to 10 ergs per second and $746 \text{ watts} = 1 \text{ horse-power}$.

Watt, James (1736-1819), an engineer, born at Greenock. A delicate child, he made small progress until the age of thirteen, when he entered upon the study of geometry with great interest. He also showed great manual dexterity, and after serving under a London mathematical instrument maker became mathematical instrument maker to Glasgow University in 1757. He was employed on surveys for the Forth and Clyde Canal (1767), as well as for the Caledonian and other canals, and he also had to do with the deepening of various rivers, including the Forth and Clyde, and with the improvement of the harbours of Arr, Port Glasgow, and Greenock. He had already begun to think about steam as a motive force, and in 1764, while repairing a model of John Newcomen's steam engine, discovered the cause of its waste of power. He, therefore, in 1765 devised the separate condenser to obviate the defect, and in 1769 patented his 'Watt' steam-engine, which was manufactured at the Soho Ironworks, W. having entered into partnership with Boulton of Soho near Birmingham. Between 1781 and 1785 he obtained patents for the sun and planet motion, the expansive principle, the double engine, the parallel motion, and a fuel-saving furnace. He also invented copying-ink and discovered independently the composition of water.

Watteau, Antoine (1684-1721), a French painter, born at Valenciennes. He went to Paris in 1702, and after

enduring much privation he was eventually recognised, being made a member of the French Academy in 1717, and painter to the king in the following year. Already, however, the state of his lungs was giving him grave cause for alarm, and he died of consumption at Nogent-sur-Marne. Despite his premature death, W. exercised a profound and lasting influence on French art, and left a great number of pictures behind him. Many of them are now in the Louvre, and others are in the Wallace Gallery, while nearly all his work was reproduced in a sumptuous *Recueil*, issued in 1734 by his friend, Jean de Jullienne. This book is exceedingly rare, but a good account of W. will be found in *L'Art du 18^{me} Siècle*, by E. and J. de Goncourt (Paris), 1860.

Wattle, see ACACIA.

Wattmeter, an electrical instrument for measuring electrical power. The power or the rate of doing work in a circuit is equal to the product of the pressure and the current. A good type of this instrument is that due to Siemens. The instrument consists of a fixed coil and a movable coil, each coil having a separate pair of terminals. The movable coil is suspended by a silk thread, and its movements are controlled by a spring which is attached to a torsion head. The fixed coil consists of a few turns of thick wire, while the suspended coil is made up of very fine wire wound on a non-metallic frame. The fixed coil is joined in series with the main current and the suspended coil is joined in the circuit in which the power is to be measured, and hence is traversed by a current proportional to the pressure. The normal position of the movable coil is at right angles to the plane of the fixed coil. The passage of the current tends to rotate it parallel to the plane of the fixed coil. The amount of this turning is proportional to the number of watts, this amount being read from the graduation marks on the torsion head.

Watts, George Frederick (1817-1904), a painter and sculptor, born in London. He studied art in the studio of William Behnes, the sculptor, and also at the Royal Academy schools. In 1843, when several prizes were offered for cartoons to decorate the Houses of Parliament, W. competed and won £300; and, resolving to spend the money on travel, he proceeded to France and Italy. Returning to England in 1847, he became a Royal Academician twenty years later; while in 1902 he was made a member of the newly instituted Order of Merit, and died in London. There are pictures from his hand in the Tate Gallery and the National Por-

trait Gallery, and there is likewise a permanent exhibition of them at Limnersleax, Surrey; while as regards his statuary, his 'Physical Energy' is in Kensington Gardens, and his full-length of Tennyson is at Lincoln. See *George Frederick Watts*, by M. S. Watts, 1912, and Rev. Hugh Macmillan's work, 1906.

Watts, Isaac (1674-1748), a writer of hymns, born at Southampton. In 1702 he succeeded to the pastorate at Mark Lane Chapel, becoming very eminent as a preacher, but he had to retire in 1712 owing to ill-health. He was the author of 600 hymns, including 'O God, our help in ages past' and 'Jesus shall reign where'er the sun,' besides *Horæ Lyricæ*, religious poems; *Divine Songs*, hymns for children; and a selection of metrical *Psalms of David*.

Arian tendency. His collected works (6 vols.) appeared in 1753.

Watts-Dunton, Walter Theodore (b. 1832), an English poet and critic, born at St. Ives, Huntingdonshire. He was critic of the *Athenæum* (1875-98), and contributed articles on Rossetti and other poets to the *Ency. Brit.* He was a life-long friend of A. C. Swinburne (q.v.). Among his publications are *The Coming of Love*, 1897; *Aylwin*, a poetic romance, 1898; editions of *Borrow* with introductions; *The Work of Cecil Rhodes*, 1907; *Studies of Shakespeare*, 1910; and numerous introductory essays in the *World's Classics* series.

Wauchope, Andrew Gilbert (1846-99), a British general, born in Midlothian. He entered the navy (1859), but obtained a commission in the army (1865). He served in the Ashanti War (1873), was in charge of Paphos, Cypr (1878), and in Egypt (1888) in the Nile in the re-conquest (1898). He became major-general in 1898, commanded the Highland Brigade under General Lord Methuen in the Transvaal (1899), and fell at Magersfontein.

Waugh, Benjamin (1839-1909), an English philanthropist, born at Settle, Yorkshire. Having studied at Airedale College, Bradford, for the Congregational ministry, he became pastor at Newbury (1865), at Greenwich (1866-85), and at New Southgate (1885-87), in which latter year he retired to devote himself entirely to his philanthropic work. He was especially interested in neglected and ill-treated children, and with John Macgregor founded an institution for the care of vagrant boys. In 1870 he

was elected to the London School Board for Greenwich, but had to retire in 1876 owing to ill-health, much to the regret of his colleagues. By 1880 he had, however, sufficiently recovered to resume his philanthropic labours, and founded in 1884, with Miss S. Smith, the London Society for the Prevention of Cruelty to Children. This was incorporated by royal charter in 1895 as the National Society for the Prevention of Cruelty to Children, after which date until 1905 W. acted as director. He published *The Children's Sunday Hour*; *W. T. Stead: a Life for the People*; *Hymns for Children*; *The Child of Nazareth*, 1906; *The Gail Cradle: who rocks it?* and edited the *Sunday Magazine*, 1874-96.

Waugh, Edwin (1817-90), the Lancashire poet, born at Rochdale. He had but little schooling, but being apprenticed to a bookseller and printer he found opportunities for reading and became especially interested in the histories of his native country. Thus he learned the literary use that could be made of the Lancashire dialect, and in 1859 won the hearts of his countrymen by his *Lancashire Songs*. He also published sketches of Lancashire life and scenery, including *Factory Folk during the Cotton Famine*, *The Chimney Corner*, *Tufts of Heather*, *Rambles in the Lake Country*, and the *Bosom Ben Stories*.

Waukegan, a city, Lake co., Illinois, U.S.A., on the W. shore of Lake Michigan, 36 m. W. by N. of Chicago by rail, is a health resort with valuable mineral springs. Pop. (1910) 16,069.

Waukesha, a tn., Waukesha co., Wisconsin, U.S.A., 15 m. W. of Milwaukee, is a popular watering-place with the celebrated Bethesda medicinal springs, the water of which forms a valuable export: there are extensive lime quarries. Pop. (1910) 8740.

Waurin, Jehan de, compiled the *Recueil des croniques, et anciennes present* (1512), which em- tle- ment of Britain to 1412. It was edited by W. and E. Hardy (1864-91) for the Rolls series, and vols. 1-III. translated.

Wausau, a city, cap. of Marathon co., Wisconsin, U.S.A., on the Wisconsin R., 160 m. N.W. of Milwaukee, is a centre of the lumber trade, and has numerous manufactures. Pop. (1910) 16,560.

Wave. The ripples on water are the most familiar kind of waves. Investigation shows that an ordinary water wave consists of a motion

which passes along the surface with a definite velocity. The individual particles of the water execute an up and down motion solely, and thus give rise to the wave form which is propagated along the surface. Waves differ in many ways, such as their respective lengths, i.e. the distance between consecutive crests; their periods, i.e. the time an individual particle takes to perform a complete up and down motion, and also in their form. The terms *wave-length* and *period* should be thoroughly understood. The *wave-length* has been defined above, but in connection with a wave-motion itself the *period* is defined as the time which the wave takes to move through its own length. To generate waves some disturbance is necessary, also the disturbed medium must have the capacity of restoring itself to its normal state. In the case of water, ripples may be started by dropping a stone into the water; this disturbs the normal state of the water, the capacity or recovery being found in the action of gravity, or in surface tension, or in the two combined. Large waves are affected chiefly by gravity and are called gravitational waves, whereas ripples, or small waves, are due chiefly to surface tension. The term *wave* has a wider significance than that indicated. From the point of view of the physicist, if the various particles of any material system are executing periodic motions, the resultant motion of the medium is termed a wave-motion. A simple instance is the piston of a steam-engine: it excites a periodic motion in that it travels back and forth in a definite constant time. If this motion is represented graphically it takes the form of a wave, and the motion is treated as a wave-motion. All material substances have some degree of elasticity, and any molecular disturbance which takes place in the body will be propagated through the body in virtue of this elasticity. Elasticity may appear in two different forms, such as the resistance offered to change of bulk and the resistance offered to change of shape. The former is called bulk elasticity or degree of *incompressibility*, and the latter *rigidity*. In gases and most liquids, such as water, the resistance to change of bulk is the only one which exists, and any propagation which takes place through the medium of these fluids is due to this type of elasticity. Such waves are called *longitudinal*, and consists of periodic variations of density in the medium. This is the case in the propagation of sound. Sound is a wave-motion in the air, and its velocity is given by the

formula $v = \frac{E}{d}$, where E is the incompressibility and d the density. This formula holds in all cases where the wave-motion is longitudinal. In the case of solids, the two types of elasticity may be brought into play. Thus there may be a wave due to a twist in the solid, and there may be a longitudinal wave, which involves in this case both the incompressibility and the rigidity. Further, waves are sometimes transmitted on the surface of an extended elastic body. The phenomenon of light is looked upon as a wave-motion. This wave-motion is due to transverse vibrations in the ether. Optical investigation has not yet revealed the existence of a longitudinal wave, and so the ether is assumed to be incompressible. The high velocity of light must lead to the conclusion that it has great rigidity or a very small density, as revealed by the Newtonian formula $v = \frac{E}{d}$.

Hertz has demonstrated the existence of electric waves which are similar disturbances in the ether, and also the existence of heat waves has been shown, all these waves travelling with the same velocity. These waves are treated as transverse vibrations in the ether, the difference between them being found in their wave-lengths. Periodic events are the most frequent in the life of nature, e.g. the rotation of the earth, the recurrence of the seasons, the tidal waves, etc., and these may be represented graphically in wave form. See 'Water Waves,' in Lamb's *Hydrodynamics*, 1895; 'Wave-motion and Sound Waves,' in Watson's *Physics*, 1907; 'Electric Waves,' in Maxwell's *Electricity and Magnetism*, 1892; 'Ether Waves,' in Larmor's *Matter and Ether*, 1900.

Waveney, a riv. of England, rises near the Little Ouse and forms part of the boundary between Norfolk and Suffolk. After a course of nearly 50 m. it joins the Yare 4 m. S.W. of Great Yarmouth.

Waverley, a tn., New South Wales, an E. suburb of Sydney, has a beautiful burial-ground. Pop. 12,500.

Wawe, a com., Brabant prov., Belgium, 16 m. S.E. of Brussels. The desperate battle fought here (June 18, 1815) between the Prussians and the French, under Grouchy, prevented the latter joining Napoleon at Waterloo. Pop. 8500.

Wax, the name given to various animal, vegetable, and mineral substances, which resemble beeswax in having a peculiar lustre. Ws. resemble fats in that they are lighter than water melt on heating, and burn

well. They are soluble in ether and turpentine, but are insoluble in water and cold alcohol, and differ from true fats in that they do not yield glycerine when boiled with alkalis. Beeswax, the most commonly known W., is secreted by bees, and is obtained by heating the 'honeycombs' in water, when the W. rises to the surface. In the crude state this W. is of impure yellow colour, has a melting point of 63° C. and a sp. gr. of 0.96. It contains 12-15 per cent. cerotic acid and some 80-85 per cent. of myricin or myricyl palmitate. For candle-making the W. is bleached in the sun after treatment with acid. The W. is also used for waxing floors, for making varnishes and lithographic crayons. Chinese W., which is used for candle-making in Japan and China, is produced by an insect (*Coccus ceriferous*), and consists chiefly of ceryl cerotate. Japan W. is obtained from the seeds of a species of *Rhus* (*R. succedanea*). It consists mainly of palmitin, is green when raw, and is bleached in the sun for use in castor oil pomades. Myrtle berry W. is another vegetable W. made from the plant *Myrica cerifera*. Palm W., or Carnauba W., is produced from the leaves of the W. palm of Brazil (*Corypha cerifera*) and the Andes (*Cerorylon andicola*). The W. is found on the leaves of the palm, and those are cut and dried in the sun. The W. is then obtained as a fine powder, when the leaves are shaken. Spermaceti (*q.v.*) is a W. obtained from the head of the sperm whale. As an example of a mineral W., ozokerite (*q.v.*) may be mentioned. The most important mineral W. is paraffin W. It is obtained by distillation of petroleum or oil shales, and is largely used for candle-making, as insulating material, in laundries with starch, for waterproofing textiles, and for making pomades and polishes. See CANDLES, SPERMACEITI, OZOKERITE, etc.

Waxahachie, cap. of Ellis co., Texas, U.S.A., 30 m. S.W. of Dallas; has a Methodist College. Pop. (1910) 6205.

Wax-Myrtle, see CANDLERBERRY.

Wax Palm, see WAX.

Waxy Degeneration, or Amyloid Degeneration, a condition characterised by the formation of an albuminous wax. It

and is the cause of bone disease, syphilis, rheumatism, etc. The organs mainly affected by amyloid degeneration are the liver, spleen, kidneys, and lymph glands. The condition is probably brought about by the continued action of toxic substances upon the proteins of

the tissues, altering their constitution until they combine with substances brought by the blood or lymph. The amyloid substance is a homogeneous translucent mass, resembling wax in its lustre and behaviour under the knife. It gives a brown colour when treated with iodine.

Way, Right of, see RIGHT OF WAY.

Waycross, a co. seat of Ware co., Georgia, U.S.A., 96 m. S.W. of Savannah, is the centre of a cotton and sugar growing district, and has saw and planing mills and machine shops. Pop. (1910) 14,485.

Wayne, Anthony (1745-96), an American general, called 'Mad Anthony' for his reckless courage, was born at Easttown, Pennsylvania. He raised a regiment of volunteers (1776), and was sent, as its colonel, to Canada. He was in command at Ticonderoga until 1777; fought at Brandywine, Germantown, Valley Forge, Monmouth, and Paoli. His most famous exploit was the carrying of Stony Point (July 15, 1779). He aided Lafayette in Virginia (1781), and took part in the siege of Yorktown. Appointed general-in-chief (1792), he made an advantageous treaty with the Indians (1795).

Waynesboro, a bor. in Franklin co., Pennsylvania, U.S.A., 14 m. S.E. of Chambersburg, manufactures engines and machines, pottery, flour, and lumber products, and is the centre of an agricultural region. Pop. (1910) 7199.

Ways and Means, Committee of. At the close of the debate on the ... the House ... self into a C. of ... consider the ways and means of raising the sum required for the ensuing year's estimates, by the duties of ... the ... fund and:

Wazan, or Wezzan, a holy city and the residence of the Grand Shercef, or spiritual ruler of Morocco. 53 m. N. of Fez. Pop. (estimated) 10,000.

Wazirabad, a tn., dist. of Gujranwala, Punjab, India, 60 m. N. by W. of Lahore, manufactures iron and steel goods. The Alexandra railway bridge, one mile distant, spans the Chenab R., and was opened in 1876 by the Prince of Wales. Pop. 18,000.

Weald, or Woodland, of Kent and Sussex, the area lying between the North and South Downs. In this area the two members of the Lower Cretaceous strata, the Wealden and Lower Greensand, are found. The Wealden, which attains a thickness of some 2000 ft., consists of clays, shales, sandstone, and shelly limestones.

Wealdstone, a tn., Middlesex, England, adjoins Harrow-on-the-Hill. Pop. (1911) 11,923.

Wealth, may be defined as anything which has an exchange value, and consequently is in itself the basis or subject of the whole science of political economy. In common parlance W. is regarded as merely a synonym for an individual's sum total of worldly possessions, but political economy, as its name implies, takes account more or less of some of the most widely accepted and rational principles of government. W. and money are far from being identical terms; the converse assumption was once, however, acted upon to the extent of placing artificial restraints upon commerce, so as to prevent precious metals from being sent out of the country. As Mrs. Fawcett puts it, our forefathers 'mistook the sign for the thing signified' (*see on this CAPITAL, CURRENCY, and MONEY*). In the conventional language of political economy, the three requisites of the production of W. are Land, Labour, and Capital. Labour in the above context necessarily excludes all labour that is not either 'directly' or 'indirectly productive,' i.e. labour which does not increase the collective material W. of the community as opposed to that of a class of persons only. The phrase 'exchange of wealth' implies not only the existence of property, but that that property is owned not by society generally but by individuals and classes. Hence if the institution of private property were ever destroyed the phrase 'exchange of wealth' would have no meaning, as also the various economic laws relative to the distribution of W. among certain classes and persons. W. is divided into rent, wages, and profits, or in other words, is distributed among those who are the proprietors of the previously mentioned agents or requisites of production. In some countries the same persons often own all three agents of production, for instance, wherever peasant proprietorship obtains, but in England, landowners, capitalists, and laborers are for the most part mutually exclusive classes.

Wear, a riv. of England, rises in the Pennine Chain, in the W. of the co. of Durham, and flowing E. past Durham and Chester-le-Street enters the North Sea at Sunderland. Length, 65 m.

Weasel (*Mustela vulgaris*), a widely distributed carnivore, native of Britain. Its body is about 8 in. long, and its tail 2 to 3 in. Its head is small and flattened, with lively black eyes and short rounded ears. The fur is

reddish-brown above and white below. In very cold winters it becomes quite white, except for a reddish tinge of the tail. It feeds principally on rodents and small birds, and hardly deserves its excessive persecution.

Weatherboard, a nautical term for (1) the side of the vessel which is turned toward the wind; (2) a plank placed in a ship's port to keep out the water while permitting the free circulation of air.

Weatherford, co. seat of Parker co., Texas, U.S.A., 31 m. W. of Fort Worth, has farming, cattle-raising, cotton-growing, stone-quarrying, and coal-mining industries. Pop. (1910) 5974.

Weather Forecast. Since the invention of the barometer, the scientific forecasting of weather has been attempted, but the introduction of the telegraph gave the first practical results. Professor Henry, U.S.A., had a system in operation in 1849; in 1848, Aug. 21, the *Daily News* published the first synoptic chart in co-operation with J. Glaisher of the Greenwich Observatory. Information was collected at the railway termini at 2 p.m. from station-masters all over the country, and the previous day's weather formed by Glaisher into a chart. The Smithsonian Institute, Washington, was at work on the same lines about the same time. In Europe it was the great gale which damaged the English and French fleets in the Crimea on Nov. 14, 1854, which called attention to the importance of the matter. Leverrier, in Paris, established an organisation, and the meteorological office, under Admiral Fitzroy, was organised by the English government in 1854. *Storm warnings* were issued in 1861 to 130 stations round the coast, and daily forecasts issued to the newspapers. The former were signalled from the shore by means of a large black canvas cone to shipping; the upright cone indicated a storm from the N. half of the compass, an inverted one, a storm from the S. At night three red lamps outlined the figure; these signals are still used where fishing boats are engaged. In 1879 forecasts were again established after being discontinued in 1866, and in 1881 the modern chart was instituted. The system depends mainly on telegraphic accounts from stations over a large area; the cable to Iceland and the Azores, and the 'wireless' communication from Atlantic ships, begun in 1909, has extended the area usefully, particularly in the latter case. Observations are taken at 7 a.m. at stations within a circumference extending from the Azores, through N. Africa

to the Black Sea, round through Archangel to Iceland. Full particulars

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experience and the established laws of weather science. The most important part of the work consists in plotting all the information on ; when the isobars and isotherms indicate the systems mainly. In U

most numerous in Africa, but extend to Asia and Australia. Most of them are brightly coloured, particularly in the breeding season. The bodies are somewhat elongated and the tails long, and the conical bill is powerful. The nests are constructed of grass, fibres, and twigs, attached together into a mass by a salivary

nests of the social W. B. (*Philaterus socius*) have a common roof under which as many as 1000 pairs sometimes make their home. Many species are imported to Britain and kept as pets.

Weaving, see COTTON SPINNING AND MANUFACTURE, and WOOL.

Web, see GIRDER.

Webb, Matthew (1848-83), Captain W., the channel swimmer, was born at Dawley, Shropshire. He was trained for the mercantile marine on the *Conway*, apprenticed in 1862, becoming mate (1866) and captain (1875). He successfully swam the Channel from Dover to Calais without artificial aid in Aug., 1875, covering about 40 m. in twenty-two hours. He was drowned in an attempt to swim the rapids at the foot of the Niagara Falls.

Webb, Sidney (b. 1859), an English author, born in London. He is the honorary professor of public administration, London University, and on the board of the School of Economics, and has served on several Royal Commissions. Among his publications are: *Socialism in England*, 1890; *The Eight Hours' Day* (with Harold Cox), 1891; *London Education*, 1904; *Grants in Aid*, 1911; and in conjunction with his wife *Industrial Democracy*, 1897; *English Local Government*, 1906-8; *English Poor Law Policy*, 1910; *The State and the Doctor*, 1910; and *The Prevention of Destitution*, 1911.

Webb City, a city of Jasper co., Missouri, U.S.A., 160 m. S. of Kansas City by rail, is the centre of a lead and zinc mining district. Pop. (1910) 11,817.

Webbe, Samuel (1710-1816), an English musical composer, born in Minorca. In 1766 he won a prize offered by the Catch Club of which he became secretary (1791-1812). In 1787 he became librarian of the Glee Club. He wrote a large number of glee, canons, catches, and part-songs, including *When Winds Breathe Soft*, *Glorious Apollo*, and *Come, Live with Me*, as well as a quantity of church music.

Webbe, William (fl. 1568-91), an English erdite and author, was educated at St. John's College, Cam-

Weathering, the result of mechanical and chemical changes produced by the action of atmospheric agencies on exposed rock surfaces. See DENUDATION.

Weather term for that side of the ship which is towards the wind.

Weaver, a riv. of England, rises in S.W. Cheshire and flows S.E. and N. through the salt district to join the Mersey near Runcorn. Length 45 m.

Weaver, John (1673-1760), an English dancing master, born at Shrewsbury. He was the original introducer into England of the entertainments called *balloons*, which were in reality . . .

From various theatrical enterprises in London. He sometimes performed in his own productions and published numerous treatises on dancing, including *History of the Mimes and Pantomimes*, 1728.

Weaver Birds, or *Ploceidae*, a family of passerine birds allied to the finches, so called on account of their remarkable nests which, in some cases, are immense structures occupied by a colony of birds. They are

bridge. He published *A Discourse of English Poetrie* (1586) containing much valuable information about contemporary poets, an appreciation of Spenser's verse, a protest against 'tinkerly rhyme,' and some translations in hexameters of Virgil's *Eclogues*. See Morley, *English Writers*, ix.

Weber, Wilhelm Eduard (1804-91), a German physicist, was born at Wittenberg. He carried on researches in magnetism, acoustics, and electrodynamics, and in collaboration with his brother he published *Die Wellenlehre auf Experimente Gegründet*, 1825.

Webster: 1. A tn. of Worcester co., Massachusetts, U.S.A., 16 m. S. by W. of Worcester, on French R.; has iron and brass foundries, and manufactures cotton and woollen goods. Pop. (1910) 11,509. 2. A city of Hamilton co., Iowa, U.S.A., 62 m. N. by W. of Des Moines; coal, limestone, and brick-clay are worked, and foundry products manufactured. Pop. (1910) 5208.

Webster, Augusta (1827-94), an English poetess, born at Poole, Dorsetshire. In 1863 she married Thomas W. of Trinity College, Cambridge. Among her publications are *Blanche Lisle* (1860) and *Lilian Gray* (1861); *Dramatic Studies* (1866); *Portraits* (1870); the poetic dramas, *The Auspicious Day* (1872); *Disguises* (1879); *In a Day* (1882); *The Sentence*, a tragedy (1887). She also published English verse translations of *The Prometheus Bound* of Æschylus (1866) and *The Medea* of Euripides (1868). See Miles, *Poets and Poetry of the Century* (ed. 1905).

Webster, Daniel (1782-1852), a celebrated American orator, statesman, and jurist. Began practising at the bar in 1805, at Portsmouth, New Hampshire, and very soon leapt to the front of his profession. Was elected to Congress, 1813, and sat there till 1817, still practising at Boston, where he had purchased an estate. Entered Congress for the second time in 1822; elected to the Senate in 1828, and eight years later unsuccessfully ran for the presidency. In politics he seems first to have used his powerful oratorical gifts on the side of Free Trade, but afterwards espoused the system of Clay (see *TARIFF*). He was appointed Secretary of State under Harrison, and while holding that celebrated Oregon Ashburton. He and again sat in 1850 he again filled the office of Secretary of State, retaining the post till his death. Was one of the greatest American orators of all time, though he did not always employ his gifts on

the side of morality, especially when he refused to support the abolition of slavery on the ground that the Union would be endangered.

Webster, John (c. 1580-c. 1625), a dramatist, the son of a tailor, was apprenticed to the same craft, and in 1603 was made a freeman of the Merchant Taylors Company. From his pen came historical plays, comedies, and pageants. The first play written entirely by himself, and published in 1612, was a tragedy entitled *The White Devil*, which was shortly followed by *Appius and Virginia*. His masterpiece was *The Duchess of Malfi*, first performed by the King's Men at Blackfriars in 1616, and frequently revived. W.'s works were collected in 1830 by Dyce and in 1856 by William Hazlett the Younger.

Webster, Noah (1758-1843), an American lexiconographer, born at W. Hartford, Connecticut. He began life as a schoolmaster and published *A Grammatical Institute of the English Language* (1783-85), which had an enormous sale. He then began preparing his famous *Dictionary*, which appeared in 1828. W. became editor of the *Minerva* (1793) and the *Herald* and wrote *A Brief History of Epidemics* (1799), *A Philosophical and Practical English Grammar* (1807), and other works.

Webster, Sir Richard Everard, see ALVERSTONE, LORD.

Weckherlin, Georg Rudolf (1584-1653), a German poet, born at Stuttgart. He studied law; became secretary to the Duke of Würtemberg (1610-20) and was employed on diplomatic missions to England, where later he entered the service of Charles I. He published *Oden und Gesänge* (1618) and *Geistliche und Weltliche Gedichte* (1641). See edition by H. Fischer (1894-95).

Wedderburn, Alexander, first Baron Loughborough and first Earl of Rosslyn (1733-1805), a distinguished lawyer and statesman, born at Edinburgh. He was called to the bar, 1754, but left Scotland and came to London, where he became a member of the Inner Temple, 1757. He at first attacked Lord North, but was afterwards made Solicitor-General by him. In 1778 he became Attorney-General, and 1780-83 Lord Chief Justice of Common Pleas.

Wedding Ceremonies, see MARRIAGE.
Wedge, a triangular prism used for separating the particles of a body. The edge of the W. is inserted between two parts of the body and pressure is applied to the base, usually by strokes of a hammer. The edge consequently moves forward, while the slant sides push away the particles of the body in a direction perpendicular to their

faces. Examples of Ws. are knives, axes, chisels, nails, etc.

Wedgwood, Josiah (1730-95), a manufacturer of pottery called after his name, born at Burslem in Staffordshire. He worked in his brother's pottery until in 1759 he established his own manufactory, where he produced a cream-coloured porcelain, patented by him in 1763. He executed a table-service for Queen Charlotte (hence its name, Queen's ware) and another for the Czarina of Russia. From 1775 he employed Flaxman, the sculptor, to execute designs and studied to create only the most beautiful and delicate ware. He made some exquisite copies of classical vases, notably of the Portland vase. He published pamphlets on his art, and his catalogues were translated into many European languages. See Jewett's *The Wedgwoods*, 1865; Church's *Life*; and Rathbone's *Old Wedgwood*, 1893-98.

Wedmore, a vil., Somersetshire, England, 7 m. W.N.W. of Wells. It is noted for the treaty (sometimes called Treaty of Chippenham) concluded here (878) between King Alfred and Guthrum the Dane, by which the country N. of Watling Street was ceded to the Danes.

Wednesbury, a municipal and parl. bor., Staffordshire, England, 7½ m. N.W. of Birmingham. There are extensive manufs. of iron (boller plate, bar iron, axes, tools, gunlocks) steel. Coal, iron, and limestone worked in the neighbourhood. P (1911) 28,108.

Wednesday (A.-S. *Wōdnesdæg*, Woden's Day), the fourth week. It was the *Dies Mercurii* of the Romans, whom the French call it *Mercredi* (Mercur). It is regarded by the Persians as a 'red-letter day,' because it was created on the fourth day.

Wednesfield, a par. and suburb of Wolverhampton, Staffordshire, England; has coal mines and manufs. steel traps, locks, and keys. Pop. (1911) 6492.

Weed, a name sometimes applied in Scotland to affections of the breast, or, more generally, any sudden illness in women after

Weedon Beck, a par. and suburb of Northampton; has blast furnaces, barracks, and powder magazines. Pop. (1911) 4150.

Weeds. The fight with W. may begin when the ground is dug in winter; perennial W. such as couch, dandelion, plantain, and sheep's-bit, and out, thrown into a heap, and

As fast as annual W. show in spring they should be hoed up into the sun; this should be continued through the summer. The last crop of annual W., which has no time to seed, may be dug in as green manure.

Weehawken, a township, Hudson co., New Jersey, U.S.A., on the Hudson R., 2 m. N.N.E. of Hoboken and connected with New York City by ferry; is a residential suburb of the latter. Pop. (1910) 11,223.

Week (A.-S. *wic*), a period of seven successive days, as in Jewish and Christian calendars, especially such a period beginning with Sunday and including in addition to that day Monday, Tuesday, Wednesday, Thursday, Friday, and Saturday. The W. has been in use in Eastern countries from the earliest times, but was not introduced into the Roman calendar till after the reign of Theodosius (4th century A.D.). The names of the days of the W. are derived from the planets, the hours being allotted to the seven planets in the order of their supposed distances from the earth, and each planet being regarded as presiding over the day whose first hour belonged to it. Thus the days of the Roman W. were assigned in order to the sun, the Moon, Mars, Mercury, Jupiter, Venus, and Saturn. The Latin nations have retained the names derived from these deities, but

of Mars, Woden of Mercury, and Venus.

W. is 5 m. N.N.W. of the Tuzela; is a sacre of the by Dinguian, Pop. 1700.

Weeping, an involuntary expression of anguish or of pain. Its chief characteristics are sobbing, bewailing, tears. Among primitive races the weeper often knocks his breast, tears his hair, and cries out with a loud voice. W. may also be a sign of great joy and of uncontrollable laughter. Excessive W., alternating with helpless laughter, is one of the signs of hysteria.

Weeping Tree, a tree with branches of drooping tendency. Varieties of this kind occur in a number of species, notably the birch, elm, oak, poplar, and willow. They are usually propagated by grafting or by cuttings.

Weesp, a com., Holland, prov. of N. Holland, on the Veelt, 6½ m. S.E. of Amsterdam. Pop. 707.

castle; contains the villages of Seaton Burn and Six Mile Bridge. Pop. (1911) 6701.

Weever, John (1576-1632), an English antiquary and poet, born in Lancashire, educated at Cambridge. Read widely contemporary poets, and in 1599 published *Epigrammes in the Oldest Cut and Newest Fashion*, with a portrait of the author. In 1601 W. published a second volume of verse, *The Mirror of Martyrs*, which was possibly inspired by Shakespeare's *Henry IV.* W. also wrote *An Agnus Dei*, 1606; *Ancient Funerall Monuments*, 1631.

Weevils, Plant-eating Beetles, or *Curculionidae*, a very large family of beetles of the group Rhynceophora, of world-wide range. They are characterised by the possession of a distinct beak or snout which is sometimes very long. The larvæ are white, fleshy grubs with wrinkled skin and bent bodies, and usually have no legs. These and the beetles of many species cause great damage to cultivated plants, while many cause much loss by their destruction of grain. The large brown pine W. (*Hyllobius abietis*) is a serious pest of forest trees, often destroying acres of young conifers, most of the damage being done by the adults, though in most species it is the grubs which are more mischievous. Garden Ws. feed at night and seek shelter during the day, and can be caught by laying sacks on the ground.

Wehlau, a tn., prov. of E. Prussia, Prussia, at the confluence of the Alle and the Pregel, 42 m. S.W. of Tilsit; has iron foundries and manufs. of machinery. Pop. 5300.

Weida, a tn., Saxe-Weimar, Germany, on the Weida R., 18 m. W. by N. of Zwickau; has woollen manufs. Pop. 9300.

Weighing Machine, an adaptation of the steel-yard for the weighing of heavy goods. The greater portion of the weight is indicated by weights placed in a pan at the end of the long arm of the steel-yard, while a travelling poise on the arm serves to indicate the remainder. The power is multiplied some hundreds of times by the steel-yard itself and levers situated under the weighing platform.

Weights and Measures. In order to measure any quantity of length, time, mass, etc., it is necessary first of all to fix on a definite quantity of the same kind and call this the unit of measurement. The unit selected, any other quantity will be measured by the number of units it contains. The concrete representation of a unit is termed the 'standard.' In the English, or foot-pound-second system, the unit of length is the foot, a foot being one-

third of a yard. The yard is defined as the distance between two plugs of gold sunk in a bar of platinum which is kept in the Exchequer offices, London, at a temperature of 62° F. This is the standard yard. This standard is not big enough for all purposes, and so the mile (= 1760 yds.) is used for the measurement of greater lengths. Similarly, for some purposes it is not small enough, and hence the yard is further subdivided to feet and inches. The British system, or F.P.S. system, has for units of length, mass, and time, the foot, pound, and second. The foot is defined above. The unit of time, the mean solar second, is derived from the average length of the solar day. The unit of mass, the pound avoirdupois, is the mass of a piece of platinum preserved in the Exchequer offices. English commercial measures are arranged at 62° F. in air, the barometer being 30 in. at mean sea-level.

BRITISH SYSTEMS

MONEY

4 farthings (f) . . .	= 1 penny (d.)
12 pence . . .	= 1 shilling (s.)
20 shillings . . .	= 1 pound (£)
	or 1 sovereign

Standard gold coin is 22 carats, i.e. is an alloy of 22 parts gold to 2 parts of copper. Silver coins are also of alloy, being made of 222 parts silver to 18 of copper. 'Copper' money is made of bronze (95 copper, 4 tin, and 1 of zinc), the halfpenny being 1 in. in diameter, and three pennies and five half-pennies weighing the same, viz. 1 oz. avoirdupois.

LENGTH (LONG MEASURE)

12 inches (in.) . . .	= 1 foot (ft.).
3 feet . . .	= 1 yard (yd.).
5½ yards . . .	= 1 rod, pole, or perch.
40 poles (220 yds.) . . .	= 1 furlong (furl.).
8 furlongs (1760 yds.) . . .	= 1 mile (m.).
3 miles . . .	= 1 league.

Additional measures of length are:

1 chain . . .	= 100 links = 22 yds.
10 chains . . .	= 1 furlong
(Used in land surveying)	

6 feet . . .	= 1 fathom.
100 fathoms . . .	= 1 cable's length
(For recording depth of soundings)	
6080 ft. . .	= 1 knot
1870 yards . . .	= 1 nautical mile
(For measuring rate of sailing)	
4 inches . . .	= 1 hand
(Used in measuring horses)	

AREA (SQUARE MEASURE)

144 square inches	= 1 square foot.
9 square feet	= 1 square yard.
30½ square yards	= 1 square pole.
40 square poles	= 1 rood.
4 roods	= 1 acre (4840 sq. yds.).
640 acres	= 1 square mile.

Since 22 yds. = 1 chain, then 484 sq. yds. = 1 sq. chain. Thus a square chain is $\frac{1}{16}$ part of an acre, or 6400 square chains are contained in a square mile.

MEASURES OF VOLUME AND CAPACITY

Cubic Measure

1728 cubic inches	= 1 cubic foot.
27 cubic feet	= 1 cubic yard.

Cubic measure is used for measuring the volume of solids, such as stone, brickwork, and wood.

A marine ton	= 40 cubic feet.
1 stack	= 108 cubic feet.
1 cord	= 128 cubic feet.

For solids such as corn, sand, etc., measures of capacity may be used.

Measure of Capacity (Liquid or 'Dry' Measure)

4 gills	= 1 pint.
2 pints	= 1 quart.
4 quarts	= 1 gallon.
2 gallons	= 1 peck.
4 pecks	= 1 bushel.
8 bushels	= 1 quarter.
5 quarters	= 1 load.
2 loads	= 1 last.

One gallon of water weighs 10 lbs. avoirdupois and contains 277.463 cub. in. In U.S.A. the gallon contains only 231 cub. in., and the other measures are proportionately smaller. The pint of 'liquid measure' is also only about $\frac{1}{2}$ of the pint of 'dry measure.'

Wine Measure

2 pints	= 1 quart.
4 quarts	= 1 gallon.
10 gallons	= 1 hogshead.
12 gallons	= 1 tierce.
2 tierces	= 1 puncheon.
1½ puncheons	= 1 pipe or butt.
2 pipes	= 1 tun.

Ale and Beer Measure

4 gills	= 1 pint.
2 pints	= 1 quart.
4 quarts	= 1 gallon.
9 gallons	= 1 firkin.
2 firkins	= 1 kilderkin.
2 kilderkins	= 1 barrel.
1½ barrels	= 1 hogshead.
1½ hogsheads	= 1 puncheon.
1½ puncheons	= 1 butt or pipe.

Imported wines have varying sizes for

the casks, but always 2 hogsheads = 1 pipe or butt, and 2 pipes or butts = 1 tun. A hogshead of claret = 46 gals.; 1 pipe of Madeira or Cape Pontac = 92 gals.; 1 pipe of Marsala = 93 gals.; 1 pipe of port = 115 gals.; 1 pipe of Lisbon = 117 gals.; 1 butt of sherry = 108 gals.; 1 tun of Hock or Moselle = 30 gals.

WEIGHTS

1. *Avoirdupois Weight*

16 drams	= 1 ounce.
16 ounces	= 1 pound.
14 pounds	= 1 stone.
2 stones (28 lbs.)	= 1 quarter.
4 quarters	= 1 hundredweight (cwt.).
20 cwt.	= 1 ton.

By the Weights and Measures Act, 1878, it was enacted that gold, silver, platinum, and precious stones might be sold by troy weight, and also that drugs might be sold by apothecaries' weight.

2. *Troy Weight*

24 grains	= 1 pennyweight (dwt.).
20 pennyweights	= 1 ounce (oz. troy).
12 ounces troy	= 1 pound (troy)
1 lb. troy	= 3700 grains, and 1 lb. avoirdupois = 7000 grains (troy).

3. *Apothecaries' Weight*

20 grains or minims	= 1 scruple.
3 scruples	= 1 drachm.
8 drachms	= 1 ounce.
12 ounces	= 1 pound.

... = 480 grains.
... = 1 ounce of 480 grains, employing in its place the ounce (avoirdupois) of 437½ grains. Thus apothecaries' weight became:

137½ grains	= 1 ounce.
16 ounces	= 1 pound.

4. *Apothecaries' Fluid Measure*

60 minims	= 1 fluid drachm.
8 drachms	= 1 fluid ounce.
20 ounces	= 1 pint (pt. or O.).
8 pints	= 1 gallon (gal., C., or Cong.).

For rough approximation, one half-wineglassful = 2 tablespoonfuls = 4 dessert-spoonfuls = 8 teaspoonfuls = 8 fluid drachms = 1 fluid ounce.

5. *Diamond and Pearl Weight*

3½ grains (av.)	= 1 carat.
or 4 pearl grains	= 1 carat.
151½ carats	= 1 ounce (troy)

The pearl grain is smaller than the

grain avoirdupois, 5 pearl grains being equal to 4 avoirdupois grains, and 600 to the troy ounce. By the Weights and Measures Act of 1897 metric weights may be used in the United Kingdom for all purposes—then 1 avoirdupois grain = 65 milligrammes, 1 pearl grain = 52 milligrammes, and 1 carat = 205 milligrammes.

MEASURES OF TIME

60 seconds . . .	= 1 minute.
60 minutes . . .	= 1 hour.
24 hours . . .	= 1 day.
7 days . . .	= 1 week.
365 days . . .	= 1 year.
366 days . . .	= 1 leap year.
100 years . . .	= 1 century.

The solar day is the interval between two successive passages of the sun over the meridian of a certain place. This interval varies in length since (1) the earth's orbit is an ellipse and not a circle; (2) the sun is not in the centre of the ellipse, but in one of the foci; and (3) the sun's path does not travel due E. and W. During the solar day the earth revolves on its axis nearly one degree ($\frac{360}{365.25}$) more than 360° , owing to the amount of its movement in its revolution round the sun. The sidereal day is the interval between two passages of a star over the same meridian. This interval requires the earth to revolve exactly 360° on its axis; and the period must

necessarily be of invariable length, and there must be one more day in a sidereal year than in a solar year. The length of the sidereal day = 23 hrs. 56 min. 4 sec. of a common or civil day.

ANGLE MEASURE.—The magnitude of an angle is generally expressed in circular measure for scientific purposes. The unit of circular measure, the radian = the angle subtended at the centre of a circle by an arc equal to the radius. To convert degrees to radians the following formula is employed $\frac{\theta}{360^\circ} = \frac{\theta^r}{2\pi}$ where θ = the angle in radians, θ^r = the angle in degrees, and $\pi = 3.1416$.

60 seconds (")	= 1 minute (').
60 minutes .	= 1 degree (°).
90 degrees .	= 1 right angle.

PAPER MEASURE

24 sheets	= 1 quire.
20 quires	= 1 ream.
2 reams	= 1 bundle.
10 reams	= 1 bale.

PHYSICAL MEASUREMENTS.—These are made both by using the units of the British or F.P.S. system, or by the use of the C.G.S. system. In the latter the units of length, mass, and time used are the centimetre, gramme, and second. These are fundamental units from which various absolute units are derived (see UNITS.)

(For the metric system see article on METRIC SYSTEM.)

MISCELLANEOUS WEIGHTS AND MEASURES

Anchovies, barrel . . .	= 30 lbs.
Barley, bushel . . .	= 47 to 49 lbs.
Beer, butt . . .	= 100 gals.
Biscuits (Admiralty bag) . . .	= 102 lbs.
Brandy, puncheon . . .	= 120 gals.
" hogshead . . .	= 60 gals.
Butter, barrel . . .	= 224 lbs. (4 firkins)
Cocoa, bag . . .	= 112 lbs.
Coffee, bag . . .	= 140 to 168 lbs.
" bale (Mocha) . . .	= 224 to 280 lbs.
" barrel . . .	= 112 to 168 lbs.
Cotton, bag (American) . . .	= 400 to 500 lbs.
" " (Egyptian) . . .	= 700 to 740 lbs.
" " (Indian) . . .	= 500 to 600 lbs.
Flour, American barrel . . .	= 196 lbs.
" barrel . . .	= 220 lbs.
" bushel . . .	= 56 lbs.
" sack . . .	= 280 lbs.
Grain, last . . .	= 80 bushels.
Gunpowder, barrel . . .	= 100 lbs.
Hay, truss (old) . . .	= 56 lbs.
" " (new) . . .	= 60 lbs.
" load (old) . . .	= 18 cwt. (36 trusses)
" " (new) . . .	= 19 cwt. 1 qr. 4 lbs.
Hides, last . . .	= 12 doz.
Hops, bag . . .	= 280 lbs.
" poeket . . .	= 1½ to 2 cwt.
Oats, barrel . . .	= 14 stone
" bushel . . .	= 38 to 40 lbs.

MISCELLANEOUS WEIGHTS AND MEASURES—continued

Pepper (black), bag	= 316 lbs.
(white), bag	= 168 lbs.
Pork, barrel	= 224 lbs.
Potatoes, sack	= 168 lbs.
Quintal	= 100 lbs.
Raisins, barrel	= 112 lbs.
Rice, bag	= 168 lbs.
Rye, bushel	= 55 lbs.
Sago, bag	= 112 lbs.
Silk, hank	= 840 yds.
Saltpetre, bag	= 168 lbs.
Soft soap, barrel or pack	= 256 lbs.
" firkin	= 64 lbs.
Straw, truss	= 36 lbs.
" load	= 36 trusses
Sugar, bag	= 112 to 196 lbs.
Tobacco, hogshead	= 12 to 18 cwt.
Turpentine, barrel	= 224 to 280 lbs.
Wheat, bushel	= 57 to 60 lbs.
Wool, sack	= 364 lbs.

WEIGHTS, MEASURES, AND
MONEY OF FOREIGN
COUNTRIES.

It is impossible in the short space allotted to this article to give the various weights and measures of all the different countries. In Canada, Malta, and U.S.A. the British weights and measures are used. With slight modification of the names used, the metric system has been adopted by Austria, Belgium, Brazil, Bulgaria, Central American states, Chile, Egypt, France, Germany, Greece, Italy, Mexico, Norway, Peru, Roumania, Servia, Spain, Sweden, Switzerland, Turkey, etc., etc. Burma and British India use the same weights and measures. The various measures vary considerably, and much confu-

sion is the result. For Bengal we have local measure:

$\frac{1}{2}$ inch	= 1 jow or job
3 jobs	= ungli or ungulee.
3 ungli	= 1 girah.
8 girahs	= 1 lath or cubit.
2 laths	= 1 guz = 1 yard.

In Bombay 1 guz = 29 in., and 24 tasu or $1\frac{1}{2}$ lath = 1 guz. The Bengal maund (82½ lbs. bazaar weight; factory weight is $\frac{1}{10}$ of bazaar weight.) = 40 sers (1 ser = 16 chittacks.) In Madras 8 vis = 1 maund, 20 maunds = 1 candy = 500 lbs. Thus the Madras maund is less than the Bengal maund by one-third. The Bombay ser and maund are about one-third of the Bengal ser and maund.

Some of the more common measures in use abroad are given with their English equivalents below:

<i>China</i> —1 catty = 1½ lbs., 1 picul = 1 cwt. 2½ lbs. (100 catties).
<i>Greece</i> —Oke = 2½ lbs., quintal = 123 lbs.
<i>Russia</i> —Pood = 36 lbs., chetwert = 5½ bushels, verst = ½ miles.
<i>Denmark</i> —Tönde of land = about 1½ acres.
Tönde of coal = 4·6775 bushels.
Tönde of corn = 3·8 bushels.
Pund = 1·102 lbs.
<i>Sweden</i> —Skälpund = 1 lb. (·937 lbs.).
Kanna = 4·608 pints ($\frac{1}{4}$ gallon).
<i>Turkey</i> —Oke = about 2½ lbs.
Quintal = 125 lbs.

TABLE OF FOREIGN MONIES

Country	Money of account	Value in British Money £ s. d.	Coins
Austria-Hungary	Krone or crown	0 0 10	20 krone (G.) = 16s. 8d., 10 hellers (n.) = 1 krone
Belgium	See France		
Brazil	Milreis	0 2 3	10 milreis (G.) = £1 2s. 6d., 40 reis (b.) = 1d., 100 reis = 1 milreis (s.)
British Empire—			
Australasia	Same as Great Britain		
British Honduras and Canada	Dollar of U.S.A.		

TABLE OF FOREIGN MONIES—*continued*

Country	Money of account	Value in British Money			Coins
		£	s.	d.	
British Empire					
Ceylon . . .	Silver rupee	0	1	4	15 rupees (G.) = £1
India . . .	Rupee	0	1	4	15 rupees (G.) = £1
	(= 16 annas)				1 rupee (s.) = 1s. 0½d.
					1 anna = 1d.
					1 piece (b.) = ½d.
					1 pie = ¼d.
Hong Kong	British and				Same as Japanese yen
Labuan, and	Mexican				
Straits Settlements	silver dollar				
Newfoundland .	Gold dollar of U.S.A.				
S. Africa . . .	Same as Great Britain				
Bulgaria . . .	See France				
China	Silver tael	0	6	6	1000 cash = 100 conderin
	(about)				= 10 mace = 1 silver
					tael = 6s. 6½d.
Denmark, Norway, and Sweden	Krone	0	1	1½	20 krone (G.) = £1 2s. 0½d.
Egypt	Gold pound of 100 piastres	1	0	3½	100 öre = 1 krone (s.)
Finland	Mark	0	0	9½	Pound (G.), 10 piastres (s.)
France	Silver franc = 100 centimes	0	0	9½	1 mil (n.) = ½d.
					10 and 20 marks (G.)
					25 francs (G.) = 19s. 10d.
					20 francs (G.)
					10 francs (G.)
					5 francs (G.)
					1 franc (s.), 10 centimes (b.)
Germany	Mark	0	0	11½	100 pfennige, 1 mark (s.),
					20 marks (G.) = 10½d.
Greece	Drachma	0	0	9½	5, 10, 20, 50, and 100
					drachmas (G.), 5 drachmas (s.)
Holland and Dutch E. Indies	Florin	0	1	7½	100 cents. = 1 florin (s.),
Indo-China . . .	Piastre	0	1	2	10 florins (G.)
					1 piastre (s.), 5 piastres (G.)
Italy	Lira	0	0	9½	5, 10, 20, '50, and 100
					lire (G.), 5 lire (s.)
Japan	Yen	0	2	0½	100 sen = 1 yen, 1, 2, 5,
					10, and 20 yen (G.)
Mexico	Peso (100 cents.)	0	4	0½	1 peso (s.), 5 peso (G.) =
					£1 0s. 2½d.
Persia	Khran of 20 shahis	0	0	11½	1 toman (G.) = 200 shahis
					= 9s. 5d.
Portugal	Gold millreis (1000 reis)	0	4	5½	½ coroa (G.) of 5 milreis =
					£1 2s. 2½d.
					100 reis = 1 teston (s.)
Russia	Silver rouble of 100 kopecks	0	2	1½	1 kopeck (b.), 1 rouble (s.), 10 roubles (G.)
Spain	Peseta	0	0	9½	25 pesetas (G.), 5 pesetas (s.)
Sweden	Same as Norway and Denmark				
Switzerland . . .	Same as France				
S. American States—					
Argentina	Silver peso of 100 cents	0	3	11½	5 pesos (G.) = 19s. 10d.
Chili, Columbia, and Uruguay	Silver peso of 100 cents.	0	3	9	5 pesos (G.) = 18s. 9d.
Peru	Silver sol	0	2	0	1 libra (G.) = £1
Turkey (Ottoman Empire)	Gold Turkish pound of 100 piastres	0	15	0½	1 piastre (s.) = 2d.
United States . .	Gold dollar of 100 cents.	0	4	1½	1 eagle or 5 dollars (G.)

G., gold; s., silver; n., nickel; b., bronze.

LAWS OF WEIGHTS AND MEASURES.

—The Act of 1878 was the principal Act, amendments being made by the Acts of 1889, 1892, and 1897. Section 1 of the Act of 1897 declares legal the use of metric weights and measures for all purposes. The Bread Act of 1836 makes bread saleable only by weight, except in the case of French and fancy bread or rolls. In Scotland (Act of 1892) and in Newfoundland the weight of bread must be stamped on the loaves. The Acts of Parliament referring to weight, measures, and coinage, may be seen at the British Museum, and, as a rule, in public libraries, assize courts, etc., and a 'Chronological Table and Index to the Statutes' may be obtained from his Majesty's stationers.

See Buchanan, *Tables of Weights and Measures*, 1838; J. H. Norman, *The Universal Cambist*, 1897; Browne, *Money, Weights and Measures of all Nations*, 1899; Martin, *Tables of Weights, Measure and Coinage*, 1904.

Weihaiwei, a British territory and coaling station in the Chinese prov. of Shantung, with a total area of 285 sq. m., including the Is. of Linking. In 1895 it was taken from China by the Japanese, who left it three years later. It was then leased by the Chinese government for ninety-nine years to Great Britain. Farming and fishing are the chief industries of the inhabitants. Pop. about 150,000.

Wei-ho, a riv., China, flows E. through the S. of the prov. of Shensi to join the Hwang-ho above Tung-kwau.

Weil, Gustav (1808-89), a German Orientalist of Jewish descent, born at Sulzburg. He became librarian (1838) and professor of Oriental languages (1861-89) at Heidelberg. Among his
hammered der
der Chalifen,
den der M.
trans. 1846).

Weimar, a city of Germany, cap. of the grand duchy of Saxe-Weimar, on the l. b. of the Ilm, 13 m. E. of Erfurt. It is justly famous as having been at one time the residence of the most illustrious men of letters in Germany (e.g. Goethe, Schiller, Herder, and Wieland) under the patronage of the Duke Charles Augustus. It has also various manufs. Pop. 34,582.

Weimar, see SAXE-WEIMAR.

Weinberge, or *Königliche Weinberge*, a tu., Bohemia, Austria, on the Moldau; an eastern suburb of Prague. Pop. 77,093.

Weingarten, a tu., Württemberg, Germany, 43 m. S.S.W. of Ulm. The Abbey Church (1724) contains a magnificent organ. Pop. 8077.

Weinheim, a tu., Baden, Germany,

10½ m. E.N.E. of Mannheim; has tanneries and various manufs. It was destroyed by the French in 1688. Pop. 14,159.

Weinsberg, a tu., Württemberg, Germany, 26 m. N.E. of Stuttgart. The Castle of Weibertreu (woman's faithfulness) was the scene of a famous siege in 1140. Pop. 3271.

Weipert, a tu., Bohemia, Austria, on the Erzgebirge, at an alt. of 2380 ft., 37 m. W. by S. of Teplitz; manufs. laces and haberdashery. Pop. 11,834.

Weir, see RESERVOIR.

Weir-Mitchell Treatment, or Rest Cure, a system for curing certain functional nervous conditions. In its most thorough form it involves absolute rest in bed, no effort of any kind being allowed. Nourishing food, especially milk, must be taken in great abundance, and massage and electrical treatment are applied.

Weishaupt, Adam (1748-1830), a German jurist and author, born at Ingolstadt, in Bavaria, where he became professor of canon and natural law (1772-85). He founded the Order of the Illuminati (1776), and wrote *Apologie der Illuminaten* (1786). *Pythagoras* (1790), etc.

Weissenburg, a tu. of Germany, in Alsace-Lorraine on the R. Lauter, 20 m. W. of Karlsruhe. Under the old German empire it was a free city until the end of the 17th century, when it was ceded to France. In 1870 the first battle of the Franco-German War was fought here, when the Crown Prince of Prussia defeated the French troops under Douay. It is now an industrial town with manufs. of leather, matches, and stockings. Pop. 6772.

Weissenfels, chief tu. of a circle of the gov. of Merseburg in the Prussian prov. of Saxony. Pop. (1911) 19,758.

Weissensee, a tu., Saxony, Prussia, 16 m. N. by E. of Erfurt. Pop. 13,031.

Weisshorn, a mountain of the Swiss Alps, canton Valais, between Nendavue and Val d'Anniviers. W. of the Zermatt Valley, rises to 14,800 ft. The mountain is named by the Pr.

Pr. The
ten
gary.

47 m. ... silk
and wine industries. Pop. 11,000. 2.
A tu., Moravia, Austria, on the
Berzwa, 22 m. S.E. of Olmütz;
manufs. cloth. Pop. 8732.

Weizsacker, Karl (1822-99), a German Protestant theologian, born at Oehrlingen, near Berlin. He was a controversialist, with a keen critical sense, and was one of the leading scholars in the 'Higher Criticism.'

Only a few of his works have been translated.

Weizsacker, Julius (1826-89), a German historian, brother of the foregoing, born at Oehringen; educated at Tübingen and elsewhere. Professor of history at Tübingen (1867) and Berlin (1881). His works deal chiefly with German mediæval history, and are characterised by vast erudition, but are faulty in point of style and interest.

Welbeck Abbey, seat of the Duke of Portland, and incorporating the remains of a 12th century abbey, stands in a park of 2283 acres, in Welbeck parish, Nottinghamshire, England, $3\frac{1}{2}$ m. S.W. of Worksop.

Weleker, Friedrich Gottlieb (1784-1868), a German philologist, born in Grünberg, and studied at Giessen. In 1806 he travelled to Rome, where he met the famous Danish archaeologist, Zozza, whose life and essays he afterwards published, and by whose example he was stimulated to that subtle appreciation of the works of ancient art which appears everywhere in his works. On his return he held important professorships at German universities. Some of his writings are: *Die Aschyleische Trilogie*; *Der epische Tyklos der die Homerischen Gedichte*; *Griechische Götterlehre*. See *Life* by Kekule (Leipzig, 1880).

Weld, Woold, Dyer's Rocket, or Greenweed (*Reseda luteola*), a tall plant (order Resedaceæ) with racemes of yellow flowers. It occurs on chalky soils and was formerly grown to furnish a yellow dye.

Welding. Through a wide range of temperature below its melting-point iron has the property of continuing in a pasty condition. Therefore, when raised to a white heat, pieces of iron or steel can be welded or united, by pressure or hammering. Most metals pass rapidly from the solid to the liquid state, and so do not fulfil the conditions necessary to admit of W. Such substances as glass and platinum can also be welded. In forging iron the temperature is raised above the temperature of annealing. Thus the crystals are able to recover their normal state after any deformation occasioned by hammering and working the metal.

Well, see ARTISIAN WELLS, BORING, WATER SUPPLY.

Welland: 1. a tn., Welland co., Ontario, Canada, 24 m. W.N.W. of Buffalo. Pop. 6500. The Welland Canal (1824-29) between Lake Ontario (Port Dalhousie) and Lake Erie (Port Colbourne) runs parallel with the Niagara R. By the enlarged route (completed 1885) it is 267 m. long, 14 ft. in depth, and by means of twenty-six locks rises 326 ft. 2.

A river, England, rises on the boundary between Northamptonshire and Leicestershire, and flows N.E. to the Wash, which it enters 9 m. below Spalding, to which town it is navigable. Length 70 m.

Welle, a river of Central Africa, trib. of the Congo. It rises in about 34° N. 28° E., and flows W., turns abruptly S. and forms the difficult Tongo rapids, and finally enters the Congo in about 30° S., 17° $59'$ E. It was first discovered in 1870, since when various further explorations have been made.

Wellesley, a tn. of Norfolk co., Massachusetts, U.S.A. Its College for Women (founded 1870) had in 1913 1275 students with 123 instructors.

Wellesley, Arthur, see WELLINGTON.

Wellesley, Richard Colley, first Marquess Wellesley (1760-1842), a statesman, was the eldest son of Gamett W., first Earl of Mornington, and the brother of the first Duke of Wellington and Lord Cowley. He went to India in 1797 as governor-general, which position he held for eight years, when his policy was much attacked, but finally approved. In 1809 he was sent as ambassador to Spain, and on his return in that year became Foreign Secretary in Percival's ministry. He was Lord-Lieutenant of Ireland from 1821-28, and again in 1833-34. He retired from public life in 1835. His Indian despatches were published in 1836. There are biographies by Pearce (1846), Malleson (1889), Torrens (1880), and Hutton (1893).

Wellesley Province, see PROVINCE WELLESLEY.

Wellingtonborough, a market tn. of Northamptonshire, on the Nen, has manufs. of boots and lace, and some trade in corn. Pop. (1911) 19,758.

Wellington: 1. A tn. in Shropshire, England, 10 m. E. of Shrewsbury, at the foot of the Wrekin, in an agricultural and mining dist. It is the Great Western Railway junction for Manchester. Pop. (1911) 7820. 2. A tn. in Somerset, England, 7 m. from Taunton, with manufs. of woollen and serge goods. The famous Duke of Wellington took his name from this place, and on the summit of the Black Downs is a monument to his memory. Pop. (1911) 7634. 3. The cap. of New Zealand, a city in the prov. of the same name in North Is., situated on Cook Strait. It is the seat of Victoria College and a branch of the New Zealand Institute. Among its public buildings are: Government House, Houses of Parliament, a museum, and Freemasons' Hall. It is a prosperous, industrial town, with manufs. of candles, soap, wool,

motches, boots, etc. The exports and imports in 1911 were valued at £9,320,509. Pop. (1911) 64,372; with suburbs 70,729. 4. A tn. of New S. Wales, Australia, in Wellington co., on the Macquarie R.; 65 m. N.N.W. of Bathurst. The district is agricultural, cattle and sheep are reared, and fruit, wheat

There are the neighb

A tn. of Cape Colony, S. Africa, about 50 m. N.N.E. of Cape Town, not far from Bain's Kloof pass. Pop. about 5000. 6. The cap. of Sumner co., Kansas, U.S.A., on Slate Creek, 30 m. S.W. of Wichita, with grain elevators, flour mills, etc. Pop. (1910) 7034.

Wellington, Arthur Wellesley, first Duke of (1769-1852), third son of Garrett, first Earl of Mornington, born either at Dangan Castle, co. Meath, Ireland, or at 24 Upper Merrion Street, Dublin (see on this *Burke's Peerage* and the *National Dictionary of Biography*); educated at Eton, whence he was removed owing to the early death of his father, and later at Pignerol's Military Academy at Angers. Entered as an ensign in the 73rd regiment in 1787, and then for a few years sat as member for Trim. But after he commenced his military command at the head of a brigade, under the Duke of York, in Holland, in 1794, down to the climax of a phenomenal military career at Waterloo, he did not, at least for any appreciable period, pursue politics. It was in India as a colonel in the war against Tipoo that he first gave signs of that transcendent military genius, which in less than twenty years was to earn for him the highest honours it is in the power of any state to confer upon a military hero. After being left in command of the troops at Mysore, he baffled Napoleon's Oriental plan of a descent on Southern India from Egypt as a base, by invading Mysore and destroying or scattering the 40,000 followers of Dhoondyah Waugh before a French soldier could have been sent there. In 1803 he was appointed chief political and military agent in the Deccan and the Southern Mahratta states, and on the fresh outbreak of trouble with the native chiefs, Scindiah and Stolkar, he added to his reputation by the signal defeat of an overwhelming force at Assaye. Though he received the thanks of parliament and was knighted for his services he does not appear either to have been satisfied with his treatment or his prospects. He advised his brother, the governor-general, to resign on the ground of the hostility of the directors of the E. India Co. and the want of support from the cabinet (*National Dictionary*

of *Biography*). He himself resigned his command and appointment in the early part of 1805, and shortly afterwards sailed for England. In 1806 he was returned as member for Rye, and a year later became Chf. Secretary for Ireland and a privy councillor; but on the threat of a French invasion he was soon in active service again. After a short campaign in Denmark, which ended in the complete humiliation of the Danes, he was sent to Spain, when it became clear that it was possible materially to check French pretensions in that country. He landed at Corunna in July 1808, but not being in sole or chief command was almost immediately involved in difficulties with incompetent rivals like Dalmypie and Burrard, much in the same way that his genius was thwarted in India by persons whose social status was in advance of their martial capacity. In 1809, after his return to England and resignation, he was sent out in sole command, and from that point onward began a series of splendid victories which culminated in the complete evacuation of Portugal and Spain by the French. He drove Soult from Oporto and routed him near the mountains of Galicia. He then marched into Spain and defeated the French at Talavera (being created Baron Douro of Wellesley and Viscount Wellesley of Talavera). After rendering Lisbon secure by the wonderful achievement of the lines of Torres Vedras, he defeated Masséna, the most famous of Napoleon's generals, at Almeida, and so cleared Portugal of the French. He took the fortresses of Badajoz and Ciudad Rodrigo after a fierce fight with Masséna at Fuentes d'Onore, and soon afterwards entered Madrid in triumph after winning the battle of Salamanca. Other great French armies, however, poured into Spain, and W. wintered, in 1812, within the lines of Torres Vedras. It was at Vittoria that he gained the most decisive victory of the Peninsular War, routing King Joseph and Marshal Jourdan and capturing a vast amount of arms and munition. Soult, unable to drive back the English and the allies, was forced back, after a series of defeats in the Pyrenees, into France, and W., following him up, clinched his brilliant campaign at Toulouse. In 1815, loaded with honours, W. was ambassador to the restored Bourbon court, and British representative at the congress of European powers at Vienna, when news came of Napoleon's escape from Elba. In a few months W. had rid Europe of any further fear of Napoleon by his last and greatest victory.

Waterloo (q.v.), and returning to England was granted £200,000 for the purchase of the estate and mansion of Strathfieldsaye in Hants, and received with every conceivable honour. Re-entering the political field he was twice Secretary of State, and once Prime Minister. He was by no means a great politician, but was at least honest and sagacious in his opposition to electoral reform and his militarist oppression of the Chartist. Died at Walmer Castle, and buried in Westminster Abbey by the side of Nelson. See W. H. Maxwell's *Life, Military and Civil of the Duke of Wellington*, 1849; C. D. Yonge's *Life of Field Marshal the Duke of Wellington*, 1860; G. Latham Browne's *Wellington*, 1888 (consisting of extracts from despatches and other works); Lord Roberts' *Rise of Wellington*, 1895; Napier's *History of the Peninsular War*; Seborne's *History of the War* in 1815.

Wellington College, a military school (and railway station) Berkshire, England, 4 m. from Reading. It was opened by the Duke of Wellington (1856), in memory of the Duke of Wellington, for the education of the sons of deceased military officers.

Wellingtonia, see SEQOIA.

Wells: 1. A city, bishop's see, parl. and municipal bor. in the co. of Somerset, 120 m. from London. Its history begins in Saxon times, and Ina, King of Wessex, is said to have founded its first church in 704. Its cathedral is mainly Early English. It has manufs. of paper, brushes, etc. Pop. (1911) 4655. 2. A seaport of Norfolk, 24 m. from King's Lynn. It has a trade in malt, corn, and fish. Pop. (1911) 2565.

Wells, Charles Jeremiah (c. 1799-1879), an English poet, friend of Keats, Hazlitt, and Hunt, born at Edmonton. He practised as a solicitor in London (1820-30), and then adopted a literary career, his chief productions being *Stories after Nature*, 1822; *Joseph and his Brethren*, 1824 (new ed. 1876); and *Claribel*, 1845. In 1874 he burnt a number of plays and poems in disappointment at his want of success. He has been highly praised by Swinburne.

Wells, Henry Tanworth (1828-1903), an English painter, born in London. He was at first a miniature painter. In 1845 he exhibited 'Master Arthur Prinsep,' at the Royal Academy. He was elected A.R.A. in 1866, and acted as deputy president of the Academy during Lord Leighton's absence. His works include: 'Tableau Vivant,' 1865; 'Victoria Regina,' 1880; and 'The Queen and her Judges,' 1887.

Wells, Herbert George (b. 1866), an English novelist, whose works are

translated into several languages. He began by establishing a new type of story evolved from a combination of scientific facts and imagination, of which his *Time Machine* (1895) and *The War of the Worlds* (1898) are examples. He is much interested in Socialism, and was a member of the Fabian Society. *New Worlds for Old* (1908) and *A Modern Utopia* are a record of his thought and opinions about this time. His novels have since then always had a sociological flavour, but their later tendency is to avoid dialectic of any kind, and merely to present conditions and environments without any political bias. Some critics have seen, however, in the later sociological novels, such as *Tono Bungay* (1909) and *The New Machiavelli* (1911), a tendency towards a conservative reaction. Mr. W.'s latest volumes are: *The History of Mr. Polly*, 1910; *Marriage*, 1912; *The Passionate Friends*, 1913.

Wells, Sacred, have been centres of worship and religious magic from the earliest times. The primitive mind attributes all the forces of nature with the act of some being capable of volition, and at a certain stage this being becomes conceived of as separate from, and often inhabiting the place or thing connected with him. Thus it is not strange to find the conception of water-spirits and nymphs in all parts. Great Britain shared this state of mind, and the old conception continued in certain popular ceremonies down to quite recent years, though during the middle ages some saint was generally substituted for the original water-deity. Famous British wells are those of St. Winifred (Welshpool, Shropshire), St. Andrew (Mallow), St. Keyne (Cornwall), and St. Dun (Denbigh). The last named was one of the 'cursing wells,' by certain ceremonies performed at which it was thought that one might bring about the death of an enemy.

Wellston: 1. A city of Jackson co., Ohio, U.S.A., is the centre of a great coal and iron mining district. Pop. (1910) 6875. 2. A suburb of St. Louis, Missouri, U.S.A. Pop. (1910) 7312.

Wellsville: 1. A city of Columbiana co., Ohio, U.S.A., on the R. Ohio, 52 m. below Pittsburgh. It is an active commercial centre, with various manufs. Pop. (1910) 7768. 2. A tn. of Alleghany co., New York, U.S.A. Pop. (1910) 4382.

Wels, a tn. of Upper Austria, on the l. b. of the Tann. It has manufs. of powder, paper, leather, etc.

Welsh, John, see WELCH, JOHN.

Welsh Language and Literature, see WALES.

Welsh Onion (*Allium psitulosum*), a perennial plant with long fibrous roots. It is grown for its large succulent leaves, which are used in salads in the spring.

Welsh Rabbit, the name given to a savoury consisting of cheese which is melted and seasoned and spread over buttered toast. The phrase is probably of slang origin, like *Munster plums* which means potatoes. The form *rarebit* is doubtful.

Welsh Torrier, a small attractive terrier of about 20 lbs. in weight. Its colour is black and tau, or black, grizzle, and tan, and except for this it strongly resembles the wire-haired fox terrier, though its skull is slightly wider between the ears; these are V-shaped and are carried forward on the cheeks; the neck is moderately long, and the shoulders strong and sloping; the ribs are deep and well sprung, and the chest is deep though narrow; the thighs are muscular and the forelegs straight and well boned; the feet are small and round, and the coat is hard, wiry, dense and close.

Welwitsch, Friedrich Martin Josef (1806-72), an Austrian botanist, born at Klagenfurt, Carinthia. In 1839 he went on a botanical expedition to the Cape Verde Is. and the Azores, and became director of the botanical gardens at Lisbon. From 1853-61 he was engaged in botanical expeditions in Portuguese West Africa. In 1863 he settled in London. He published: *Synopse explicativa das amostras de madeiras e drogas medicinas de coligadas na provincia de Angola*, 1862.

Wemibly, an urban dist. of Middlesex, near Harrow-on-the-Hill, on the Brent. Pop. 4500.

Wemyss, a par., Fifeshire, Scotland, on the Firth of Forth, 2½ m. S.W. of Leven, includes the vils. of Methil and Innerleven, West and East Wemyss, all engaged in coal-mining. Pop. (1911) 23,104.

Wemyss, East and West, two adjoining vils., Fifeshire, Scotland, 1 m. S.W. of Buckhaven. West W. has a good harbour, and a trade in coal. Near East W. is Wemyss Castle, once occupied by Mary Queen of Scots. Pop. (1911) 6123.

Wen, a term popularly applied to any small superficial tumour, and more particularly to sebaceous cysts. These are of the duct of the sebaceous gland and the cyst.

They may be removed by making a free incision and clearing out the whole cyst.

Wenceslaus, or **Wenzel**, was Duke of Bohemia about 928-936. Being converted to Christianity, he en-

deavoured to make his people also Christians, and was assassinated by his brother in consequence. He was regarded as the patron saint of Bohemia.

Wenceslas IV., King of Bohemia and Holy Roman Emperor, the son of the Emperor Charles IV. W. was not a good ruler. In 1391 his own nobles rebelled against him and made him a prisoner, till he was set free through the influence of the princes of the German states.

Wen-Chow, a treaty-port of China, in the prov. of Che-Kiang, 163 m. S.S.E. of Hang-Chow. It is well fortified in an out-of-date fashion, and has manufs. of paper, silk, etc. Pop. nearly 80,000.

Wenden, a ta., Livonia, W. Russia, on the Aa, 60 m. N.E. of Riga by rail, has ruins of a castle which was the residence of the Brethren of the Sword and, from 1237, of the grand-master of the Teutonic Knights. Pop. 6400.

Wendover, a tn., Buckinghamshire, England, 5 m. S.E. of Aylesbury. Pop. 2050.

Wendroa, a par. in Cornwall, England, 8 m. W. by S. of Falmouth. It has tin mines. Pop. (1911) 6381.

Wends, a Slav race found mainly in Lusatia, a dist. between Brandenburg, Saxony, and Silesia. They are the remnant of a nation which formerly extended as far as the Elbe, but is now decreasing almost daily. About the middle of the 16th century, the country of the W. extended eastward to the Oder, but has been gradually reduced since then, and it is significant that now even within the limits assigned to the W. German is spoken exclusively in the towns, and practically all speak that language as well as Slav.

Wener Lake, see **VENER**.

Wenlock Beds, a series of rocks belonging to the upper Silurian age. To it belongs Dudley Limestone, a fossiliferous Silurian limestone chiefly developed near the town of Dudley.

Wensleydale Peerage, so called after Sir James Parke, Baron Wensleydale, a judge of the court of exchequer, who was created a life-peer in 1856. The House of Lords protested that the privilege of the crown to elect life-peers had been lost by disuse, and it revived the

peers might at the wish be outnumbered in the life-peers. Wensleydale accordingly created a peer in tail male, since then a certain number of Lords of Appeal in Ordinary have been created official life-peers.

Wentworth, Thomas, see **STRAFFORD, THOMAS WENTWORTH**, first EARL OF.

Werdau, a tn. of Saxony, Germany, on the Pleisse, 5 m. N.W. of Zwickau, with textile and chemical industries, iron foundries, etc. Pop. 20,821.

Werden, a tn. of Rhenish Prussia, on the Ruhr, 16 m. N.E. of Düsseldorf, with manufs. of cloth, paper, silk, and shoes. It has coal mines and stone quarries. Pop. 12,741.

Werderh, a vil. of Westphalia, Prussia, in the circle of Altena, 25 m. E. of Barmen, with iron and steel factories. Pop. 9819.

Weregild. In Anglo-Saxon times a money compensation for murder or manslaughter. W. was first introduced into Gaul by the conquering Franks, and then into Britain by the Saxon invaders. By this system every man's life had a fixed pecuniary value called the W., and the amount was graduated according to the rank of the person slain; for example, a churl's value was fixed at 200 s.; a lesser thane, 600 s.; a king's thane, 1200 s.; an ealdorman, 2400 s.; an aetheling or prince, 3600 s., and a king 7200 s. The W. of a murdered freeman was payable as compensation to his kin; that of a serf was paid to his master.

Were-Wolf, see LYCANTHROPY.

Werff, Adriaen van der (1659-1722), a Dutch painter. He lived chiefly at Rotterdam, devoting himself to genre and portraiture, and in 1696 he was appointed court painter to the Elector Palatine.

Werff, Peter van der (1665-1718), a Dutch painter, and brother of Adriaen van der W. He concerned himself mainly with portraiture and domestic scenes.

Wergeland, Hendrik Arnoldus (1808-45), a Norwegian poet, born at Christiansand. After passing through the university, he published a successful dramatic satire. His friends called him the 'Byron of Norway.' W. entered the clerical profession in 1829, but in 1834 resigned. The sentiments expressed in a poem entitled *Creation, Man and the Messiah*, were deemed incompatible with his sacred calling. He was appointed keeper of the university library, and in 1840 keeper of the Norwegian archives. A collected edition in 9 vols. of his works was begun in 1851.

Wermelskirchen, a tn. of Rhenish Prussia, 20 m. S.E. of Düsseldorf, with textile industries and cigar factories. Pop. 16,376.

Werne, a com. in Westphalia, Prussia, in the circle of Bochum, with iron, steel, and chemical works. Pop. 16,598.

Werner, Abraham Gottlob (1750-1817), a geologist, was born at Wehrau in Lusatia. Having written a treatise *On the External Charac-*

teristics of Minerals, he became professor of mineralogy at Freiburg in 1775. He was also keeper of the Cabinet of Natural History and councillor of the mines in Saxony.

Werner, Friedrich Ludwig Zacharias (1768-1823), a German dramatic poet and priest, born at Königsberg in Prussia. While at the university of Königsberg, he came under the influence of Rous-seau's teaching and became an ardent romanticist. In 1811 he was converted to the Roman Catholic Church, and three years later was ordained priest and became a popular pulpit orator in Vienna. His *Der Vierundzwanzigte Februar* (1815) set the fashion of writing 'fate tragedies.' His other works include *Die Söhne der Thals*, 1803; *Martin Luther*, 1806; and *Wanda*, 1810. See *Lives* by Schülz (1841) and Poppenberg (1893).

Wernigerode, a tn. in the prov. of Saxony, Prussia, at the foot of the Harz Mts., 43 m. S.W. of Magdeburg. It contains the fine château of the princes of Stolberg-Wernigerode, with its valuable library. Pop. 18,366.

Werther, see GOETHE, JOHANN WOLFGANG.

Wesel, a tn. and fortress, Westphalia, Prussia, at the confluence of the Rhine and the Lippe, 46 m. S.W. of Münster, has manufactures of wire, lead, and other metal goods, pottery, cement, and soap. Pop. 24,453.

Weser, one of the largest rivers of Germany, formed by the junction of the Werra and the Fulda, the latter of which rises in the Rhöngebirge in Bavaria. From the junction at Münden the river flows towards the North Sea into which it falls after a course of 225 m.

Wesley, Charles, see WESLEY, JOHN.

Wesley, Charles (1757-1831), and Samuel (1766-1837), sons of Rev. Charles W. of Bristol, nephews of the famous Rev. John W., both celebrated musical prodigies. Charles was a good organist, and left six organ concertos, a drama, songs, anthems, and other compositions. Samuel wrote an oratorio, *Ruth*, at eight, became one of England's finest organists, and devoted considerable energy to popularising J. S. Bach.

Wesley, John (1703-91), a methodist, was a younger son of Samuel W., rector of Epworth and Wroot, and author of many poems. He was educated at Charterhouse, London, and Christ Church, Oxford, and took holy orders in 1725. He served his father as curate at Wroot from 1727-29, and then returned to the university as tutor in Lincoln College, which position he retained for six years. At Oxford, his younger brother, Charles Wesley (1707-88), had formed a small

group of undergraduates who followed very strictly the ordinances of the church and were dubbed by their friends 'methodists.' W. joined the party and became its leader. Soon after his father's death in 1735, he went to America to take charge of the Georgian mission, but in the following year retired from the charge owing to his being involved in legal proceedings consequent upon his having repelled one of his congregation from the communion. On his return he came under the influence of Peter Böhler, a Moravian, and became a member of that society's chapel at Fetter Lane, London; but in 1740 he broke off his connection with it. In the previous year he had begun field-preaching and had opened a Methodist chapel at Bristol. He preached all over the country and was especially successful with the poorer classes, who were less in touch with the Established Church than the well-to-do. It was not until 1784 that W. executed the 'deed of declaration,' from which dates the beginning of modern Methodism. He wrote many books and pamphlets, and himself collected his prose works (1771-74) in thirty-two volumes. W.'s *Journals* are the best authority for his career, but

Coke and
(1791-93),

Wesley, :
was like his

the finest organist of his day; his appointments included Hereford Cathedral (1833-35), Leeds parish church (1842-49), and Gloucester Cathedral (1865-76). He left much magnificent church music, anthems, services, and organ pieces, and the fine work *The Wilderness*, his best-known composition.

Wesleyan Methodist Churches, see METHODISM.

Wessex (O.E. *West-seaxe*, West Saxons), an ancient kingdom in S.W. Britain, founded by the W. Saxons or Gewissas, under Cerdic and his son,

extended his kingdom beyond Hampshire and over the Is. of Wight. His son, Ceawlin (560-91), was a warlike king and made repeated inroads upon his British neighbours. In 591 his

Ceaw-

territory he had conquered beyond the Thames was seized by the Mercians, and Wessex ceased to be a powerful state. In the 7th century the W. Saxons were converted to Christianity. During the reign of

Ine (688-726) the Mercians were defeated at Burford (752) and a code of laws drawn up. Ecbert (800-36), who had spent his youth in exile at the court of Charles the Great, restored W. to its former power, and ultimately conquered the whole of England. He defeated the men of Cornwall in 815 and 835, subdued Mercia (825-29), annexed Kent, Sussex, and Essex, and before 828 was acknowledged overlord by all the peoples S. of the Tweed. Her territory was increased and her power strengthened under Alfred (q.v.). Consult Elton, *Origins of English History*.

West, Benjamin (1738-1820), an historical painter, born at Springfield, Pennsylvania. He began portrait painting at sixteen, and produced his 'Death of Socrates,' but in 1760 went to Italy to study, and settled in London in 1763. Here he came under the notice of George III. and soon acquired a great reputation for his historical and religious subjects; indeed, so high was he in favour that on the death of Reynolds he was made president of the Royal Academy. Among his pictures are 'Christ healing the Sick' and 'The Death of Wolfe.' He was the first to abandon the Greek and Roman and introduce modern costume into his historical painting.

West Africa, British, see GAMBIA, GOLD COAST, NIGERIA, SIERRA LEONE.

West Africa, French, see DANOMBY, FRENCH CONGO, GUINEA, IVORY COAST.

West Africa, :
SOUTH-WEST
TOGOLAND.

West Africa, Portuguese, see ANGOOLA, PORTUGUESE GUINEA.

West Africa, Spanish, see FRN-
NANDO PO, RIO DE ORO, SPANISH GUINEA.

Westall, Richard (1760-1836), an English genre painter, born in Hertford, apprenticed to an engraver on silver in 1779, and entered the schools of the Royal Academy in 1785. He was best known as a book-illustrator. Among his historical paintings in water colours the best are: 'Mary Queen of Scots going to Execution' and 'Jacob and Esau.' He became a royal academicien in 1791.

West Allis, a banking post vill. of Milwaukee co., Wisconsin, U.S.A., incorporated in 1906. Pop. (1910) 6645.

West Bay City, see BAY CITY.

West Berwick, a tn. in Columbia co., Pennsylvania, U.S.A.; incorporated in 1902. Pop. (1910) 5512.

Westborough, a tn. in Worcester co., Massachusetts, U.S.A., 32 m. S.W. of Boston. It has a state

lunatic asylum, and manufs. of shoes, leather and straw goods, carpets, etc. Pop. (1910) 5446.

West Bromwich, a parl., municipal, and co. bor. of Staffordshire, England, 5 m. N.W. of Birmingham. It is a busy industrial town in the heart of the 'Black Country,' with manufs. of hardware, iron goods, bricks, etc. Pop. (1911) 68,345.

Westbrook, a tn., Cumberland co., Maine, U.S.A., 4 m. N.W. of Portland; has paper, silk, and cotton mills. Pop. (1910) 8281.

Westbury, a market tn. of Wiltshire, England, 4 m. S.S.E. of Trowbridge. It has a fine old church with historic associations, and its manufs. include woollens, clothing, and iron goods. Pop. (1911) 3433.

Westbury, Richard Bethell, Baron (1800-73), Lord Chancellor of England, born at Bradford-on-Avon. He was elected fellow of Wadham College, Oxford (1819), was called to the bar at the Middle Temple (1823), and became leader of the Chancery bar (1841). He entered parliament as Liberal representative for Aylesbury (1851), and in the following year was returned by Wolverhampton, becoming Solicitor-General (1852), Attorney-General (1856), and Lord Chancellor (1861). He delivered judgment in the famous *Essays and Reviews* case of 1863. See *Life* by T. A. Nash.

West Calder, a tn. and par., Midlothian, Scotland, 15 m. S.W. of Edinburgh; coal, ironstone, and limestone are worked. Pop. 3000.

West Chester, a bor. and co. seat of Chester co., Pennsylvania, U.S.A., 25 m. W. of Philadelphia; has large market gardens and dairy farms, and manufs. agricultural implements. Pop. (1910) 11,767.

Westcott, Brooke Foss (1825-1901), Bishop of Durham, born at Birmingham. He took holy orders in 1851, was made canon of Peterborough (1869), regius professor of divinity at Cambridge (1870), chaplain to Queen Victoria (1870), canon of Westminster (1883), and Bishop of Durham (1890). He edited the N.T. in Greek with Dr. Hort (1882), and wrote: *History of the New Testament Canon*, 1855; *Introduction to the Study of the Gospels*, 1860; *Revelation of the Risen Lord*, 1881; *Social Aspects of Christianity*, 1887, etc. See *Lives* by B. F. Westcott (1903) and J. Clayton (1906).

Westerly, a tn. of Washington co., Rhode Is., U.S.A., on the Pawcatuck R.; with woollen and cotton mills. Pop. (1910) 8696.

Western Australia (Westralia, formerly Swan River Settlement), a British crown colony (settled about 1829) and state (1901) of the Commonwealth of Australia. It is bounded E.

by S. Australia and the Northern Territory, N.W. and S. by the Indian Ocean. It extends W. of 129° E. long., the most westerly point, including islands off the coast, being Dirk Hartog Is., off Shark's Bay; and forms about a third of the continent, its area being about 975,920 sq. m. The coast-line is indented, but has few good natural harbours; Fremantle, port of the capital, Perth, on the Swan, is the best. Westralia forms part of 'the great Austral plain,' and is largely plateau land with little vegetation in the interior. A succession of small mountain chains border the W. and S.W. coast, the Stirling, Darling, Herschel, and Victoria ranges being the chief, while in Kimberley district (N.) are the King Leopold, M'Clintock, and other ranges. There are few large rivers or permanent lakes. Besides the Swan may be mentioned the Blackwood, Murchison, Gascoyne, Ashburton, Fortescue, Fitzroy, and Ord (in order from S.W. to N.E.). The temperature varies considerably, Dec. to Feb. being the hottest months, but in general the climate is healthy. The E. division contains large deserts—the Great Victoria Desert (S.), Gibson (central), and Great Sandy (N.)—with dense scrubs of acacia and spinifex (porcupine grass). There are fine forests S.W. and W., abounding in all kinds of eucalyptus gums (jarrah, karri, tuart, wandoo, red gum), sandalwood (*Santalum cygnorum*), baobab, mangroves, and mallet trees (used in tanning), and palms. (For further details of its botany and zoology, see AUSTRALIA.) The best grazing and agricultural land comes S. of Geraldton. The crops include wheat, barley, oats, potatoes, and various fruits (peaches, grapes, lemons, oranges). Sheep, cattle, pigs, goats, and other live stock are reared. Camels are used in parts as beasts of burden. Gold, timber, wool, pearl-shells, hides, and pearls (mainly from oyster-beds off Cossack) are the chief exports. The principal gold-fields are Kimberley and Pilbarra (N. and N.W.; discovered 1882), Peak Hill and Murchison (W.); Yilgarn district (1882), and the Las (S., 1890). Black tin, copper, limestone, and ironstone are also found. The Spanish and Portuguese were the first explorers here, the Dutch followed in the 17th century and called the country 'New Holland.' The 17th to 19th centuries saw numerous explorations of Tasman (1644), Dampier (1688), Vancouver (1791), Eyre (1841), the Forrests (1870). The present governor (1913) is Sir G. Strickland, and there

is a Legislative Council of thirty, elected for six years; and a Legislative Assembly of fifty, elected for three years. Both men and women have the franchise. Pop. 311,282. See works by Favenc (1887), Calvert (1894, 1897), Chambers (1897), Vivienne (1901), Taunton (1903).

Western Daily Press (Bristol). The pioneer provincial newspaper of the W. of England, founded in 1858. Its political views are Liberal Independent. It is one of the chief representatives of the commercial and agricultural life of the western counties.

Westfield: 1. A tn. of Hampden co., Massachusetts, U.S.A., 9 m. W. of Springfield; with manufs. of bicycles, cigars, whips, paper, machinery, etc. Pop. (1910) 16,044. 2. A tn. of Union co., New Jersey, U.S.A., 7 m. W. by S. of Elizabeth. Pop. (1910) 6420.

West Flanders, a prov. of Belgium, lying N. and E. of Franco, and bounded on the N.W. by the North Sea. With E. Flanders it was incorporated with the newly formed kingdom of Belgium in 1831. The surface is flat, and the soil well cultivated for agricultural purposes. Its capital is Bruges. Area 1249 sq. m. Pop. 880,000.

Westgate-on-Sea, a watering-place, Kent, England, 2 m. W. by S. of Margate. Pop. (1911) 3000.

West Ham, a parl. and co. bor. of Essex, England, and an eastern suburb of London. It adjoins East Ham. Pop. (1911) 289,030.

West Hartlepool, see HARTLEPOOL.

West Haven, a tn., New Haven co., Connecticut, U.S.A., separated from New Haven by the West R.; has manufs. of tools, motor-boats, and musical instruments. Pop. (1910) 8543.

West Hoboken, a tn. of Hudson co., New Jersey, U.S.A., about 2 m. W. of New York, and adjoining Jersey City and Hobok. It is famous for its silk and embroidery. Pop. (1910) 35,403.

Westhoughton, a town, England, situated in the West Riding of Yorkshire, 5 m. N. of Leeds. It is one of the largest collieries in the district. Pop. (1911) 15,000.

West Indies, a group of islands lying from the N. to the S. (from America) to within 7 m. of the coast of Venezuela (S. America). It was so called by Columbus in 1492, who believed that the islands formed the western limits of India. The total area is nearly 100,000 sq. m., of which 72,000 sq. m. are independent, 12,300 British, 3750 United States, 1350 French, 430 Netherlands, 140 Danish, and 90 Venezuelan. The archipelago

is divisible into three groups: the Greater Antilles consisting of Cuba and Hispaniola, and its dependencies, and the Lesser Antilles, which are divided among the United Kingdom, France, Denmark, the Netherlands, Venezuela, and the United States.

Relief and hydrography.—The Bahamas are partly of coral formation and generally low. There is practically no running water, though there are ample underground supplies. In the W. of Cuba are the Sierra de los Organos reaching a height of over 2500 ft., and at the extreme eastern end of the island is a range of mountains facing S., the Sierra Maestra (1400 ft. mean altitude), but the island is divided into two parts by a large marshy depression 47 m. wide, between the N. and S. coast. In consequence of Cuba being largely composed of limestone the drainage is partly underground, and many rivers are lost in swamps. Hispaniola (San Domingo and Haiti) is generally mountainous, the highest summit exceeding 10,000 ft. Puerto Rico is an elevated plateau with a large number of rivers. In Jamaica the Blue Mts. exceed 7000 ft., but in the centre and W. is a limestone plateau with deep valleys with self-contained drainage. S. of Puerto Rico the islands form a deeply submerged mountain ridge separating the Caribbean Sea from the Atlantic Ocean. This is generally mountainous and partly volcanic, and is covered with dense forests.

Climate.—There is considerable uniformity of temperature throughout the year. A double rainy season generally occurs in May and October, February and March being the driest months.

Ethnology and religion.—Negroes have largely increased since their emancipation, and quite two-fifths of the population are now negroes.

There is also a large number of coolies from India in the plantations. In Puerto Rico the population is largely of Spanish descent, but they are in the other islands generally of the negro race. The religion is Roman Catholic, the people being of Spanish descent. In Jamaica and the other British islands the whites are of British descent.

Productions.—The flora of the W. Indies is of great variety and richness. The sugar cane and tobacco plant are extensively grown, and among other crops are beans, peas, rice, maize, and

Guinea corn. Forests are numerous and wide-spreading, and produce valuable woods and delicious fruits. Palms are in great variety, and there are several species of gum-producing trees. Some locust trees have been estimated to have attained an age of 4000 years, and are of immense height and bulk. There are few mammals, but there are plenty of wild dogs and pigs, as well as opossums, muskrats, and armadillos. Water-fowl and various kinds of pigeons are in abundance, and there are many parrots and humming birds. Among domestic animals mules are largely reared, and, where possible, cattle-breeding is practised. Goats abound, and large flocks of sheep are kept. Pop. about 6,500,000. See articles relating to the various islands.

Westinghouse Brake, *see* BRAKE.

Westland, western coast prov., South Is., New Zealand, lying between the Southern Alps and the Pacific Ocean, and between Grey R. in the N. and Big Bay in the S. Area 4640 sq. m. There are extensive gold deposits and some coal. Chief towns, Greymouth and Hokitika. Pop. 14,700.

Westmann Islands, lie off the S. coast of Iceland. Many of them are uninhabited. The chief industry is fishing. Pop. about 1400.

Westmeath, an inland co., prov. Leinster, Ireland, bounded N. by Cavan, S. by King's co., E. by Meath, and W. by Roscommon. The surface is varied and is some 250 ft. above sea-level; it is a county of loughs, and contains some very fine scenery. The largest of these is Lough Ree on the Shannon, others include Lough Sheelin and Lough Kinale. There are no great elevations, the greatest heights being Knocklayde (795 ft.) and Hill of Ben (710 ft.). The principal rivers are the Shannon, the Inny, and the Boyne with their tributaries. The Royal Canal cuts through the county, affording easy communication with Dublin. Agriculture is the staple industry and dairy farming is largely carried on. Some friezes and coarse woollen materials are manufactured. The loughs are famous for their trout fishing. The chief towns are Athlone and Mullingar, the county town. The county returns two members to parliament. The county contains a number of interesting encampments, and the ruins of Multifarnham Abbey (1236) are noteworthy, on account of the tower which is 93 ft. high. The area of the county is 708 sq. m. Pop. (1911) 59,812, decreasing through emigration.

Westminster, City of, the largest of the twenty-eight boroughs which to-

gether constitute the British metropolis, is also, perhaps, the most important, for it contains the royal residence, the houses of the legislature, the supreme courts of law, the chief public offices of the executive government, and the magnificent abbey church of St. Peter, in which some of the noblest and greatest of Englishmen have been interred. The city appears to have owed its origin to a church erected here by the Saxon king Sebert (or Saebryht) and dedicated to St. Peter. Sebert died about 616. This church appears to have been destroyed by the Danes about the time of Alfred, but it was rebuilt by Dunstan in the reign of Edgar and established about 958 as a Benedictine abbey. In the reign of Edward the Confessor W. was the residence of royalty, and Edward's palace seems to have been on or near the site of the present houses of Parliament. This monarch rebuilt the abbey church with great magnificence, and, on his decease, was interred within its walls. After the Conquest, Westminster continued to be the usual residence of the Kings of England, and in the abbey church of St. Peter they were usually crowned. William Rufus built a hall as a banqueting-room to the palace, and this, restored by Richard I., is the present W. Hall. Henry III. began to rebuild the abbey church of St. Peter, having caused the ancient edifice of Edward the Confessor to be pulled down in 1245. He had previously built a new Lady Chapel. This chapel was replaced by the more extensive and costly structure now known as Henry VII.'s chapel. This was the last important alteration or addition made to the abbey until early in the 17th century, when the W. towers were rebuilt under the direction of Sir Christopher Wren. Since that time much renovation has been carried out, but no additions have been made. The extreme length of the abbey is 530 ft. 9 in. The extreme breadth is 220 ft., the length of the nave is 154 ft., and its height 105 ft. The height of the towers is 225 ft. The city has an area of 2503 acres and a pop. (1911) of 160,277.

Westminster, Dukes of, the first to hold this title was Hugh Lupus Grosvenor (1825-99), who was created Duke of W. in 1874. He was the grandson of Robert Grosvenor, 2nd Earl Grosvenor (1767-1845), upon whom the title of Marquess of Westminster was bestowed in 1831. The present holder of the title is Hugh Richard Arthur Grosvenor (b. 1879), the grandson of the first Duke and the son of Victor Alexander, Earl

Grosvenor. The family is descended from the Grosvenors of Eaton, near Chester, and traces its origin back to the conquest.

Westminster Assembly of Divines, a Puritan assembly, which sat from Aug. 1643 to Feb. 1649, in order 'to confer and treat among themselves of such matters and things touching and concerning the Liturgy, discipline and government of the Church of England, or the vindicating and clearing of the doctrine of the same.' On April 20, 1644, it submitted to Parliament its *Directory for Public Worship*, while the first part of its *Confession of Faith* was presented in Oct. 1644. Both these documents and the *Shorter and Larger Catechisms* were ratified and approved by the General Assembly of the Church of Scotland, and still remain the authorised standards of that establishment. The Assembly also attempted to set up a Presbyterian system of church government in England, but all its work was swept away at the Restoration.

Westminster Gazette, the leading London Liberal evening daily paper, established in 1892 by the late Sir (then Mr.) George Newnes. Its outstanding features were the strong and *eminently seasonable front-page articles* on the dominant political issue of the day; the brilliant cartoons of 'F.C.G.' (see GOULD, FRANCIS CARRUTHERS), and the masterly reviews in the Saturday edition of literature, fine arts, and other matters of current interest. Mr. E. T. Cook was its first editor, but retired after a few years in favour of Mr. J. A. Spender, one of the foremost Liberal political writers of the day. The W. G. is now owned by a group of leading Liberals.

Westmorland, a N. co. of England, bounded on the N.W. by Cumberland, S. and W. by Lancashire, and E. by Yorkshire. W. comprises a considerable part of what is known as the fell country and also of the lake district. The mountainous region, with its great tracts of moorland, affords some magnificent scenery and includes the heights of Crossfell (3000 ft.), Milbourne Forest (2780 ft.), Helvellyn (3118 ft.), and many others; while the lakes include Windermere, Ullswater (in part), Grasmere, and Hawes Water. The principal rivers are the Eden, running through what is known as the Vale of Eden, the Lune, and the Kent. Throughout the lake district there are crags and scars and also a number of beautiful waterfalls. The climate is for the most part cold and wet, and only about half of the co. is under cultivation, and of this the greater part is devoted to pasturage, sheep and

cattle being raised in large numbers. Oats is the main crop; granite, slate, and limestone are quarried and lead is found. The manufactures are unimportant, and include woollen goods, paper, and bobbin making. The principal towns are Appleby, the county town, and Kendal; the county returns two members to parliament. There are ancient castles at Appleby, Brough, and other places, and the ruins of Shap Abbey. W. suffered from the invasions of the Scots in ancient times, Appleby being twice sacked and burnt. During the Civil War the county was royalist, but later espoused the Jacobite cause. The area is 790 sq. m. Pop. (1911) 63,575.

West New York, a tn. in Hudson co., New Jersey, U.S.A., connected by ferry with New York. Its chief manufactures are silk, sugar, cotton seed oil, and rubber. Pop. (1910) 13,560.

Weston, a parish and village of Somersetshire, England, 2 m. N.W. of Bath, of which it practically forms a suburb. Pop. (1911) 5000.

Weston-super-Mare, a watering-place of Somersetshire, England, on the Bristol Channel, at the foot of Worlebury Hill, 18½ m. S.W. of Bristol. The town has a fine esplanade and public gardens, potteries, mineral springs, and fisheries. Pop. (1911) 23,235.

West Orange, a tn. of Essex co., New Jersey, U.S.A., adjoining Orange co., and 13 m. W. of New York City. It was only chartered as a town in 1900. There are phonograph, lawnmower, and felt-hat manufactures. Pop. (1910) 10,980.

Westphalia, a prov. of Prussia, bounded on the N. by Hanover, on the

W. by the Rhine Province, on the S. by the S. W. by the Netherlands. It has an area of 7801 sq. m. and a length and breadth of about 130 m. The S. of the province is mountainous, being diversified by the Schiefergebirge and the hills of Sauerland, and farther N. occur the Erzegebirge and the Teutoburger Wald, on each side of which lie portions of the great plain of N. Germany. On the S.W. is the wide 'bay' of Münster, and on the N.E. the valleys of the Weser and the Werre. Other rivers are the Ems, Lippe, Ruhr, Sieg, Eder, and Vechte. The climate is temperate except in the S., which is cold in winter and has a heavy rainfall. Flax is extensively grown, in addition to grain of all kinds, fruit, hemp, potatoes, peas, and beans, and swine are reared in

large numbers for Westphalian hams. The breeding of horses is also carried on and the rearing of cattle and goats is important. But the wealth of the province lies in its minerals, of which the chief are coal and iron; the former being found in the great Ruhr coalfield, which extends from the Rhineland into the province as far as Unna, the centre being Dortmund, and there is a smaller coalfield in the N. at Ibbenbüren, the latter occurring in the Schiefergebirge and the Ruhr coalfield. Besides these, zinc, lead, copper, antimony, quicksilver, stone, marble, slate, and potter's clay are also worked, and there are brine springs in the Helweg, and mineral springs at Erwitte, Lipp Springs, Oerghausen, and Driburg. Manufactures are extensively carried on, notably iron and steel, brass and bronze, tin and Britannia metal, and needles at Dortmund, Hagen, Bochum, Alfena, Iserlohn, and Lüdenscheld; linen at Bielefeld, Herford, Minden, and Warendorf; jute at Bielefeld; paper on the lower Lenne; leather around Siegen; cotton goods in the W. Other manufactures are chemicals, glass, sugar, sausages, and cigars. Trade is facilitated by the Weser, Ems, Ruhr, and Lippe, all of which are navigable, and the province is also well equipped with good roads and railways. W. is divided into three administrative divisions, Münster, Minden, and Arnberg, and has Münster for its capital. The province was constituted in 1815. Pop. 4,125,904.

West Pittston, a tn. of Luzerne co., Pennsylvania, U.S.A., on the Susquehanna R., 10 m. S.W. of Scranton, has machine and cut-glass works, silk mills, and anthracite mines. Pop. (1910) 6848.

West Point, a military post in Orange co., U.S.A., on the Hudson R., 50 m. N. of New York. The U.S.A. Military Academy was established here in 1802, and occupies an area of 31 sq. m. It comprises barracks for cadets, buildings for military exercises, museums, an observatory, chapel, and hospital. The military library is one of the finest in existence, and contains, in addition to its 50,000 vols., memorials to Edgar Allan Poe and F. McNeill Whistler, former cadets. West Point was occupied by the Americans as a military post during the Revolution and was strongly fortified. It was also, for a time, the headquarters of Washington, who recommended it as a site for a military school, which was established as early as 1791. Constitution Is. was added to the post in 1903.

Westport: 1. A seaport in Clew Bay, Mayo co., Ireland, 12 m. S.W.

of Castlebar, connected by steamer with Glasgow and Liverpool. The chief industry is agriculture. Pop. (1911) 3800. 2. A tn. on the W. coast of South Is., New Zealand. It has a fine harbour and is a shipping port for coal and gold. Pop. 4000.

West Prussia, a prov. of Prussia, situated in the N.E. of the kingdom, with an area of 9862 sq. m. It is bounded on the N. by the Baltic, S. by Russian Poland and the prov. of Posen, E. by E. Prussia, and W. by the prov. of Brandenburg and Pomerania. The coast is indented by the Gulf of Danziger, into which the Vistula flows. The province is divided into the two administrative districts of Danzig and Marienwerder, and sends twenty-two representatives to the Lower House and thirteen to the Reichstag. Agriculture is the chief industry, but there are many manufactures. Pop. 1,641,574.

Westrumite, a preparation consisting mainly of petroleum and ammonia, which is used as a road dust preventative.

West Seneca, a tn. on Lake Erie, U.S.A., 4 m. S.E. of Buffalo. Pop. (1910) 4605.

West Springfield, a tn. of Hampden co., Massachusetts, U.S.A., on the Connecticut R. It has railroad shops, cigar and paper factories, etc. Pop. (1910) 9224.

West Virginia, *see* VIRGINIA, WEST.

Westward Ho! a seaside resort of Devonshire, England, on Bideford Bay, 2½ m. N.W. of Bideford. It takes its name from Charles Kingsley's novel. It has a military college (founded 1874) and famous golf-links on Branton Burrows.

Wet, De, and Wette, De, *see* DE WET and DE WETTE.

Wetaskiwin, a tn. of Alberta, Canada, 40 m. S. of Edmonton, the centre of an extensive farming region. Pop. 4000.

Wetheral, a par. and vil. of Cumberland, England, on the Eden, 4 m. S.E. of Carlisle; has the ruins of a Benedictine abbey (1088). Pop. (1911) 2855.

Wetherby, a market tn. of the W. Riding of Yorkshire, England, on the Wharfe, 6 m. S.E. of Harrogate; has brewing industries and a cattle market. Pop. (1911) 16,210.

Wetherell, Elizabeth, *see* WARNER, SUSAN.

Wetter, Lake, *see* VETTER.

Wetteren, a market tn. of E. Flanders prov., Belgium, on the Scheldt, 8 m. E.S.E. of Ghent; has textile manufactures. Pop. 16,599.

Wetterhorn, a mountain in the Bernese Oberland, Switzerland, E. of Grindelwald, about 12 m. from Interlaken. It consists of three peaks, of

which the middle, or Mittelhorn, is the highest (12,166 ft.). The other two are known as the Hasli Jungfrau (12,149 ft.) and the Rosenhorn (12,110 ft.). The mountain was ascended first in 1844, and frequently since, the ascent being made from Grindelwald. The neighbourhood of the Wetterhorn is particularly attractive to artists, the contrast between the bright pastures and the black precipices and dazzling snow ridges being remarkably striking.

Wettin, House of, a German reigning family dating from about the mid-10th century. It has given rise to several European royal houses. Ernest I. (1784-1844), who first assumed the title of 'Saxe-Coburg-Gotha' (c. 1826), was a descendant. Dedo I. (d. 1009), son of Dietrich (d. 982), first gained possession of the county of W. His son, Dietrich II., married a daughter of the Margrave of Meissen. Under their grandson, Henry I. (d. 1103), the importance and extent of the dominions of the H. of W. increased greatly, lower Lusatia and the mark of Me being recognised as possess. Naumburg became their cap. Conrad I. and his descendants ruled from 1123-1288, when county and castle near the Saale sold to the Archbishop of Magdeburg. He retained them till the peace of Westphalia (1648); the Elector of Brandenburg then claimed them, and they were finally annexed to Prussia (Saxony).

Wetzlar, a tn. of Rhine prov., Prussia, at the confluence of the Dill and Lahn, 64 m. N.E. of Coblenz by rail; has iron mines, foundries, and manufactures of gloves and optical instruments. Goethe wrote here the *Sorrows of Werther*, 1772. Pop. 13,400.

Wexford: 1. A maritime co., prov. Leinster, Ireland, bounded on the N. by Wicklow, S. and E. by St. George's Channel, W. by Waterford and Kilkenney. The surface is hilly in the N. and W., the greatest heights being reached in Mt. Leinster (2610 ft.) Blackstairs Mt. (2409 ft.). Owing to sandbanks the coast is dangerous and the only opening of imports is Wexford Harbour and Bay, w. Waterford Harbour divides it. The county of that name in the S. to the coast to the S.E. is Tusker R. with a lighthouse, and further S. are the Saltee Is., beyond which there is a lightship. The principal rivers are the Barrow and the Slaney, both navigable for a long distance. Agriculture is successfully carried on, and sheep and cattle are reared in increasing numbers. Barley is the main crop, the fisheries are important, and some

marble is quarried. The principal towns are Wexford (the county town), New Ross, and Enniscorthy. The county returns two members to parliament. There are a number of fine old ruins in the county, including Dunbrody Abbey, Ferns Abbey, and the castles at Ferns and Enniscorthy. The area is 901 sq. m. Pop. (1911) 102,287. 2. A municipal bor. and seaport, cap. of co. Wexford, Ireland, on the R. Slaney, its importance is mainly on account of the harbour, which is formed by the estuary of the river, but owing to a bar across the mouth big vessels are unable to enter at ebb tide, and in consequence the harbour of Rosslare was built and connected by rail with W. (8 m.). The town contains the ruins of St. Sepulchre's Abbey and some fragments of the old town walls, and the barracks are on the site of an ancient castle; there are also some good modern buildings. The chief industry is shipbuilding, and there are breweries, tanneries, and distilleries; artificial manure, rope, and agricul-

manufactured, ntre of import- n was besieged garrisoned by l was the head- on of 1798. It received its first charter in 1818. It returns one member to parliament. Pop. (1911) 11,155.

Wey, a riv. of Hampshire and Surrey, England, rises near Alton in Hampshire, and flows N.E. past Godalming and Guildford to join the Thames at Weybridge. Length 35 m.

Weybridge, an urban dist., Surrey, England, 19 m. W.S.W. of London by rail, at the junction of the Wey and the Thames. W. is mainly a residential town. The Brooklands racing track was opened here in 1907, for motors and aeroplanes. Pop. (1911) 6286.

Weyburn, a tn. in Southern Saskatchewan, Canada, which of recent years has grown considerably as a

industrial centre. in route from the o Western Canada. helpfully voted for of \$285,000 for new The Cleveland company have large ch they employ 200 men in the manufacture of petrol engines, stoves, etc. W. is the headquarters of a new land district (5148 sq. m.) organised by the Dominion government in 1912.

Weyden, Rogier van der (1400-64), a Flemish painter, born at Tournai. He became town painter at Brussels (1435). Among his best known works

are the 'Magi' triptych (1450), 'The Crucifixion,' 'Expulsion from Paradise,' and 'The Last Judgment' (Prado Gallery), several Madonnas, and 'St. John the Baptist' (Frankfort). See *Life*, in German, by Hasse (1905).

Weymouth and Melcombe Regis: 1. A seaport, watering-place, market-town, and municipal borough, Dorsetshire, England, at the mouth of the Wey, 8 m. S. of Dorchester. W. and M. R., on opposite banks of the river, are connected by bridges. Weymouth Bay is shut in on the S. by the Isle of Portland. The chief industries are the quarrying of Portland stone, shipbuilding, sail and rope-making, brewing, and fishing. Pop. (1911) 22,325. 2. A township, Norfolk co., Massachusetts, U.S.A., 12 m. S.S.E. of Boston, manufs. boots and shoes and nails. Pop. (1910) 12,895.

Whale, the name for most of the members of the order Cetacea, which are relentlessly persecuted for the oil, whalebone, spermaceti, ivory, etc., which they yield. Ws. are the most thoroughly aquatic of all mammals, the fore limbs being reduced to fin-like paddles and all external traces of the hind limbs having virtually disappeared. They occur in all seas and by loose attachment of the ribs are able to expand the chest and remain a long time under water. When they rise to the surface, the heated air expelled condenses and forms a column of spray. The whalebone Ws. still develop rudimentary teeth before birth, but then these are displaced by a large number of flattened plates of bone or baleen fringed at the edges, which strain the food from the water. Whalebone is derived principally from the right W., and being strong, light, and flexible has many uses. Most Ws. are inoffensive creatures and generally swim in herds. Whalebone is absent from the toothed Cetaceans, which include not only the dolphin, porpoise, and narwhal, but also the caehalot, or sperm W., the hottle-nose, and beaked Ws.

Whangarei, a town, Whangarei co., North Is., New Zealand, on Whangarei Bay, 80 m. N.W. of Auckland; produces coal, timber, and fruit. Pop. 2500.

Wharf (Old Eng. *hwærf*, a turning-place or breakwater, from *hweorfan*, to turn), a platform or bank used for loading and unloading goods from vessels in a harbour or river.

Wharfe, a riv., W. Riding of Yorkshire, England, rises on Cam Fell, and flows S.E. to join the Ouse near Cawood. Length 60 m.

Wharnccliffe, James Archibald Stuart Wortley Mackenzie, first Baron (1776-

1845), an English politician, entered parliament in 1797 as a moderate Tory, but ultimately voted for the Reform Bill and became lord president of the council (1841) under Peel.

Wharnccliffe Meeting, so called after its originator, Lord Wharnccliffe (1776-1845), is a meeting of the shareholders of a railway or any public company, summoned to obtain their consent to a bill affecting their powers, under Standing Orders 62 to 66 of the House of Lords.

Wharton, a par., Cheshire, England, near the R. Weaver, 2½ m. N.W. of Middlewich; has a large salt industry, boat-building, and artificial manure manufs. Pop. (1911) 3300.

Wharton, Philip Wharton, Duke of (1698-1731), the only son of Thomas, Marquess of Wharton, who died in 1715. Philip went abroad in 1716, and vowed allegiance to the Pretender, who created him Duke of Northumberland and gave him the Garter. In the following year he returned to England, and submitted to George I., who created him Duke of Wharton. He opposed the attainder of Atterbury (1723) and shortly after again joined the Pretender, and later entered the Spanish service and fought before Gibraltar. There is a biography by Lewis Melville (1913).

Wharton, Thomas Wharton, Marquess of (1640-1715), a statesman, was a prominent supporter of the Revolution of 1688. He is the reputed author of *Lilli Bulero*, *Bullen-a-la*. He was a commissioner for the union with Scotland, 1706, and in that year was given an earldom. He was lord-lieutenant of Ireland from 1708-10, when Addison was his secretary. He was one of those who proclaimed George I. as King of England, and was rewarded with a marquise.

Whately, Richard (1787-1863), an archbishop of Dublin, born in London and educated at Bristol and Oxford, becoming a fellow of Oriel College. He was one of the founders of the Broad Church School, and favoured unsectarian religious education. Among his works are: *Christian Evidences*, *Peculiarities of the Christian Religion*, *The Kingdom of Christ*, *Logic and Rhetoric*. See Jane Whately, *Life and Correspondence*; and Fitzpatrick's *Memoirs*.

Wheat, or *Triticum*, a grass, the origin of which has not been definitely established. There are many hundreds of forms in cultivation, and authorities classify them as varieties or sub-varieties of the three following species: one-grained W. (*T. monococcum*), which possesses a flat short, compact ear; the two flowers of the spikelets produce only a single ripe

grain. It is sometimes cultivated on poor soils, in mountainous districts of Central Europe. Pöbsh W. (*T. Polonicum*) has awned glumes, which enclose all the flowers in the spikelet, only two of which are fertile. The grain is large and very hard; the crop is grown in Southern Europe, but is unsuited to British climate. *Triticum sativum* is divided into three races: (1) Ordinary spelt Ws., grown on poor soils, in Central Europe; (2) Two-grained spelt Ws., grown in S. Europe chiefly for the manufacture of starch; (3) *T. sativum tenax*, which has given rise to all the most important varieties, classified in four sub-races, each of which is commonly regarded as a separate species. Hard or flint W. (*T. durum*) is grown around the Mediterranean chiefly for making macaroni; Turgid or rivet W. (*T. turgidum*) produces red grain with very tall stiff straw, used for thatching purposes. The grain makes dark coloured flour, and is too poor in gluten for bread-making. Dwarf Ws. have short stiff straw with small grains; Common W. (*T. vulgare*) includes all more important varieties grown in the great W. districts. Winter Ws. are sown in autumn, and spring varieties usually in February. The average yield in Britain is about 29 bushels per acre. For diseases see BUNT, HESSIAN FLY, RUST, and SMUT. See also FLOUR. and Professor Percival, *Agricultural Botany*.

Wheatear, Fallow Chat, Fallow Finch, or *Saxicola oenanthe*, a summer migrant to Britain, often arriving in February. It is about 6 in. long, grey on the upper parts with a black streak from beak to ear and with black quill feathers, wing coverts, and tail feathers. In flight a white patch on the lower back and tail is conspicuous. The underparts are white with a buff tinge on the breast. Its food consists chiefly of insects, and towards the end the summer the birds, which are then plump and in good condition for the migration, are snared in considerable numbers for the table.

Wheat Fly, see HESSIAN FLY.

Wheatley, a par. and urban dist., W. Riding of Yorkshire, England, 2 m. N.E. of Doncaster. Pop. (1911) 5363.

Wheaton, Henry (1785-1848), an American jurist, born at Providence, Rhode Is. He was editor of *The National Advocate* in New York, practised there as justice of the marine court, was reporter for the United States supreme court, chargé d'affaires at Copenhagen (1827-35), and minister at Berlin (1835-46). His chief work is: *Elements of Inter-*

national Law; others are: *Life of Will. Pinkney, Hist. of the Northmen*, and *Hist. of the Law of Nations*, etc.

Wheel, Breaking on the, a cruel punishment, formerly inflicted on thieves, highwaymen, felons, and the like. It existed in ancient times in Greece and Rome, and was first employed in France in 1534. One mode employed was to stretch the criminal on a wheel with his hands and legs bent downwards along the spokes. The wheel was then turned so that the victim's limbs broke, while the bones of his body were broken with blows. At other times the corpse was exposed to public view on a wheel, the man having previously been beaten to death.

Wheel and Axle, a machine consisting of two cylinders on a common axis terminating in two pivots; one cylinder is of relatively small diameter and is called the *axle*, the other is larger and is called the *wheel*. Both have ropes coiled round them in opposite directions. The power is applied to the rope attached to the wheel, and as it uncoils the other rope is coiled round the axle, thus lifting the weight attached to it. The conditions of equilibrium is that the algebraic sum of the moments of the forces about the axis is zero. Thus, if P be the power acting downwards, W the weight being pulled upwards, b the radius of the wheel and a the radius of the axle, then $Pb = Wa$, from which we get the mechanical advantage, i.e. the ratio of weight to power = the ratio of the radius of the wheel to that of the axle. Examples of the machine are the water-wheel, the windlass, the handle constituting the wheel, and the capstan, the series of spokes constituting the wheel.

Wheel Anninacules, see ROTIFERA.

Wheeler, Joseph (1836-1906), an American soldier, born in Augusta, Georgia. He entered the Confederate service in 1861, and took part in the first campaigns in Kentucky and Tennessee, winning special fame in the battle of Shiloh (1862). He further distinguished himself in 1863 at Chattanooga Valley, and in 1865 as lieutenant-general commanded the cavalry in General Johnson's army until the end of the war. In 1898, having served as a democrat in Congress (1881-89), he was appointed major-general of volunteers and placed in command of the cavalry division of the army of Santiago in the war with Spain, and from 1899-1900 commanded a brigade in the Philippines, becoming brigadier-general in 1900. He published: *History of Cuba, 1496 to 1899*; *Military History of Alabama*; *History of the Santiago Campaign*; *Cavalry*

Tactics; Account of the Kentucky Campaign; History of the Effect upon Civilisation of the Wars of the 19th Century.

Wheeler, William Almon (1819-87), an American legislator, born at Malone, New York. He was called to the bar in 1845 and practised in Franklin County. He was a member of the New York Assembly (1858-59), acting as president *pro tempore*, and in 1860 was elected to Congress, being re-elected in 1869, when he served until 1877. He took a prominent part in the adjustment of Southern affairs under the Reconstruction Act, and settled the political difficulties in Louisiana by the well-known 'Wheeler Compromise.' He was vice-president of the U.S.A. under Hayes (1877-81).

Wheeling, a city and co. seat of Ohio co., Virginia, U.S.A., 46 m. by rail S.W. of Pittsburg, on the Ohio R.; manufs. iron, steel, tobacco, foundry and machine-shop products, lumber, glass, and pottery. Pop. (1910) 41,641.

Wheel-lock, *see* FIREARMS.

Whelk, or Buckie (*Buccinum undatum*), a common mollusc off British coasts, much used as an article of food. The shell is grey or brownish white, spirally grooved and with numerous raised ridges. There are other species to which the name is also applied. The name dog whelk is commonly given to *Purpura lapillus*, and also to *Nassa reticulata*.

Whetstone, George (c. 1544-87), a poet and prose-writer, born probably in London, dissipated his fortune at court and in reckless living, went to France, entered the English army, then took up literature as a profession. He collected his verses into a volume called *Rocke of Regard*; wrote a play *Promos and Cassandra*, and after an Italian visit, a collection of prose romances; also *A Mirour for Magistrates*, and various biographical elegies.

Whetstones, *see* HONES.

Whewell, William (1794-1866), an English philosopher, born at Lancaster, became a fellow, later master, of Trinity College, Cambridge, and finally vice-chancellor of the university. Among his works are: *Hist. of the Inductive Sciences, Philosophy of the Inductive Sciences, Elements of Morality, Plurality of Worlds*, etc., and translation of Goethe's *Hermann und Dorothea*. *See* Toddhunter's *Whewell*, and *Life* by Mrs. Douglas.

Whey, the watery part of milk, separated in cheese-making. It is utilised in the manufacture of milk-sugar. *See* CHEESE.

Whickham, an urban dist., Durham, England, near the R. Derwent,

4 m. S.W. of Gateshead; has coal-mines, iron, steel, and chemical works. Pop. (1911) 18,332.

Whidah, or Whydah, one of the chief towns of Dahomey (*q.v.*).

Whig, formerly the designation of one of the great political parties in England. The term is of Scottish origin, and was first used in Charles II.'s reign. According to some, it was derived from *whiggamores* or horse-drovers, and applied as a term of contempt, in allusion to the march of the people headed by the clergy to Edinburgh after the defeat of the Duke of Hamilton in 1648—to all who opposed the court. In England it was assumed as a party name by those politicians who took the lead in placing William III. on the throne. *See* POLITICAL PARTIES.

Whimbrel, *see* CURLEW.

Whin, *see* FURZE.

Whinchat, or *Saxicola rubetra*, a pretty bird that visits Britain in summer, favouring heaths and open places, where it feeds principally on insects. It resembles the stonechat in plumage except in its white streaks on the head.

Whippet, a favourite dog, particularly in the N. of England, where it is much used for running races, being capable of tremendous speed; it is trained to make for the towel held at the end of the course by its owner. It is bred in various colours, including black, red, white, fawn, and brindle, and its appearance is that of a greyhound in miniature. Its head is long and lean, with small rose-shaped ears, long muscular neck, deep capacious chest, long back, arched over the loins; the fore legs are moderately long, and the hind quarters strong and broad with muscular thighs; the tail is long and tapering.

Whipping, *see* under FLOGGING OR WHIPPING.

Whippingham, a par. and vil., Isle of Wight, England, 4 m. N.E. of Newport. The parish contains East Cowes, Osborne House, and the church of St. Mildred with memorials to Queen Victoria, the Prince Consort, Prince Leopold, and Princess Alice. Pop. (1911) 850.

Whip-poor-will, or *Antrostomus vociferus*, a N. American goatsucker, so called from its cry during the nights of its breeding season. It is about 10 in. long, mottled tawny brown in colour, with a white collar on the throat and has long stiff bristles at the base of the bill.

Whip-snake, *see* DRYOPHIS.

Whirlpool, a vortex or eddy in water caused by the inter-action of two or more currents of different strength, often by the re-uniting of a current divided by an obstacle. Dan-

gerous Ws. may occur where tidal currents mingle on coasts; in myth and fiction the dangers are largely exaggerated, as in the case of Charybdis in the Straits of Messina and the Maelstrom of the Norwegian coast. Their danger lies in rendering steering difficult during rough weather, and increasing the chance of driving on to shore. In ancient times and the days of small sailing vessels they were distinctly to be avoided.

Whirlwinds, are atmospheric vortices or eddies, the term being applied to those not so destructive as typhoons or tornadoes, but sufficiently marked to cause minor acts of damage. The essential feature of this type of disturbance is that the length of the horizontal diameter is exceeded by the height of the vertical axis. They are liable to spring up in deserts as dust-storms, or near the coast during anticyclonic weather. Some portion of the ground becomes more strongly heated than surrounding parts, the air in contact, being steady, rises in temperature, becomes less dense, and is driven upwards by incoming currents of cool air. The inequality in force of these gives rise to the swirling motions, which may be either clockwise or anti-clockwise. When of large size, a mile or so, and in humid weather, they may develop as small thunderstorms, or 'cloudbursts.' The lifting action is sometimes considerable, carts, trees, etc., being bodily transported. The W. in Kent, between Walmer and Deal, Oct. 24, 1878, destroyed everything along a track 450-700 ft. wide and more than a mile in length. Sometimes the vertical height of the disturbance is quite small. Sir R. H. Scott, *Elementary Meteorology*, 1886.

Whisky, a spirit obtained by distillation of the fermented extracts of cereals such as barley, maize, oats, etc. Potatoes, rice, sugar, molasses, and beet are also used. The substances used are subjected to the processes of mashing, pitching, and fermenting and the resulting liquid called the 'wash' undergoes distillation (see BREWING). In Scotland and Ireland the distillation is carried out in pot-stills, which consist of large copper kettles or pots having a pear-shaped head and connected to a receiver by a copper worm which runs through a tub of cold water. The Scotch pot-still W. is almost entirely malt W. Irish pot-still W. is made from a mixed grist of barley, maize, and malt, though containing about one-third of the malt. Potteen or potheen is made in Ireland stills from sugar and molasses. In England, W. is made in a patent still, whereby rapid distillation is ensured

and a purer spirit is obtained, the percentage of fusel oil present in the 'silent spirit' produced being less than 0.05 per cent (see COFFEY'S STILL). W. is generally blended when in bond. In pot-still W., fusel oil, which contains the higher alcohols and pyro-compounds like furfurol, is present to the extent of about 0.2 per cent. It was thought that during the maturing the fusel oil decomposed. This has since been found a mistaken idea and the cause of the increased flavour of the W. has been shown to be due to the interaction of the spirit with the

the casks from previously contained in the still is colourless, and the colouring of the various brands is carried out by storage in wine casks or by the direct addition of caramel or maturing wine. Pot-still W. varies in strength from some 15°-50° over-proof, while patent-still W. is generally 65°-70° over-proof. Much of the latter quality spirit is used for making methylated spirit, gin, brandy, etc., and for manufacturing and scientific purposes. For use as a beverage the patent-still W. is matured in casks for several years or carefully blended with pot-still W. In U.S.A. W. is made from maize or rye, and the distillery states are Illinois, Indiana, Kentucky, New York, Ohio, and Pennsylvania. The imposition of the tax on distilled liquors in 1791 by the American Congress led to the 'Whisky Insurrection' in W. Pennsylvania in 1794. The abolition of the tax led to quietness, but in 1812-15 the tax was re-imposed. In England and other countries a heavy excise duty is levied on all distilled spirits. The revenue derived from the excise on spirits in Great Britain in 1912 was £18,611,392. See ALCOHOL, BREWING, COFFEY'S STILL, FERMANTATION, EXCISE, SILENT SPIRIT, FUSEL OIL, etc.

Whispering Places. Places like galleries or domes (e.g. that of St. Paul's Cathedral) of such a form that sounds produced in certain parts are concentrated by reflection from the interior walls to another distant part. The surface produces a perfect echo, so that even faint sounds become audible at a much greater distance than is usual under ordinary circumstances.

Whist, a card game for four players or in the case of a 'whist drive' for an even number of sets of four players, the object of which is to score tricks. A trick made in excess of six (the number being the highest possible) scores one point; in short W., five points make a game, and a score of two games out of three wins the 'rubber'; in long W. ten points

make a game. In a W. drive the winners are those individual players who score the highest number of tricks or points, there being no question of a partnership as such taking a prize, because the individual players move from table to table according to the result of each hand. Partners holding all four honours (assuming the players elect to play for honours), i.e., the ace, king, queen, and knave of trumps, score four points; three honours score two points. In *American W.* seven points make a game, and honours are not counted. The game of W. is a very old one, and derives its name apparently from the Cornish *huist* (silence), from the supposition that it requires concentration and silence on the part of the players to play the game well.

Rules.—It is not proposed to do more here than notice those of the important rules which are less often observed. The deal commences with the player who cut the lowest card in the draw, and then passes on to the player on his left, and so on. If, whilst dealing, a card be exposed by the dealer or his partner, the others can claim a new deal, provided they have not touched their cards; and a card exposed by either adversary gives that claim to the dealer, provided his partner has not touched a card. The trump suit is determined by turning up the last card dealt, which, of course, falls to the dealer. Any player may at any time inquire what the trump suit is. All exposed cards are liable to be called and must be left face upwards on the table. The following are exposed cards: Two or more played at once face upwards; (2) any card dropped face upwards in any way on or above the table, even though snatched up so quickly that no one can name it; (3) every card named by the player holding it. If any player lead out of turn, his adversaries may either call the card erroneously led, or call a suit from him or his partner when it is next the turn of either of them to lead; but if, in spite of a lead out of turn, the other three players follow and complete the trick, the error cannot be rectified. In no case can a player be compelled to play a card which would oblige him to revoke, but the call may be repeated at every trick, until such card has been played. The penalty for a revoke is either a deduction of three points from the revoking player's score, or an addition of three points to the adversaries' score, or a deduction of three tricks from the revoking player together with the addition thereof to the adversaries' tricks. A

revoke cannot be claimed after the cards have been cut for the ensuing deal; but at the end of a hand, the claimants of a revoke may search all the tricks. If a player discover his error in time to save a revoke, the adversaries may call the card played in error whenever they think fit, or require the offender to play his highest or lowest card to that trick in which he has renounced; and any players who have played after him may withdraw their cards and substitute others. In whatever way the penalty be enforced, the revoker can under no circumstances win the game by the result of the hand during which he has revoked, nor can he score more than four. Dummy W. is played by three players. One hand called dummy's lies exposed. Dummy deals at the commencement of each other. He is not liable to penalties for revoke, as his adversaries see his cards. If he revokes and the error is not discovered until the trick is turned and quitted it stands good. If dummy's partner revokes, he is liable to the usual penalties. Dummy's partner may expose some or all of his cards, or declare that he has the game or trick without incurring any penalty; but if he lead from dummy's hand when he should lead from his own, or *vice versa*, a suit may be called from the hand which ought to have led. Double dummy is played by two players, each having a dummy or exposed hand for his partner.

Bibliography.—Cavendish on *Whist*; James Clay, *Treatise on Short Whist*; Major-General Drayton, *The Art of Practical Whist*; *Whist* (Club Series); and the *Philosophy of Whist* by Dr. W. Polc.

Progressive Whist and Gaming.—Progressive W. drives received a rude shock by the decision of the High Court in the case of *Morris v. Godfrey* (76 J.P. 297, 106 L. T. 890). Lord Alverstone's judgment emphasised the fact that the game was played for money contributed by the players; and that the necessarily indiscriminate manner in which partnerships were formed made the game practically one of chance. He did not decide and did not intend to hold that W. became unlawful merely because it was played for money. The decision, it is conceived, is clearly bad if it goes the length of saying that all W. drives are competitions in a game of chance. The predominance of chance over skill must be proved in every individual case, and it would not be difficult in any given case to call an overwhelming number of the players to swear that they had had considerable experience in the game. In practice, club secretaries and

others need have nothing to fear if, prior to the opening of the drive, they announce that the ticket money will go to defray all expenses, and that they do not guarantee to give any prizes. If prizes are subsequently given by outsiders, it is difficult to see how the above decision could affect those who organised the drive.

Whistler, James Abbot McNeill (1834-1903), a painter, lithographer, and etcher. He was born at Lowell, Massachusetts, and in 1851 he became a cadet at the military college of West Point; but he soon decided to espouse art as a profession and accordingly, in 1856, he went to Paris and entered the studio of Gleyre, where Degas and Fautin-Latour were among his fellow-students. In 1859 he settled in London, but for a long time his work was little understood; and in 1877, when some of his nocturnes were shown at the Grosvenor Gallery, they were so fiercely assailed by Ruskin in *Fors Clavigera* that W. retaliated, suing his critic for libel, and at the same

The case result being granted damages, but th

had shown himself a master of wit; and thenceforth till his death he was widely known in this relation, even by many people wholly unacquainted with his work as a painter. Much has been written about him subsequently, notably a biography by E. and J. Pennell (London, 1909; but the best account of the Ruskin trial is contained in W.'s own book, *The Art of making Enemies* (London, 1890), which embodies also excellent critical comments on

Whiston, William (1667-1717), mathematical divine, born Leicestershire, became a fellow Clare College, Cambridge. While chaplain to Moore, Bishop of Norwich, W. produced his first book, *New Theory of the Earth*. He became vicar of Lowestoft in Suffolk (1698), and in 1703 succeeded Newton as Lucasian professor at Cambridge, but in 1710 was expelled for his heretical opinions, which he was too honest to disguise. Among his works are: *Primitive Christianity Revived*, *Life of Samuel Clarke*, and a translation of *Josephus*. See his *Memoirs*. He was possibly the prototype of Goldsmith's *Vicar of Wakefield*.

Whitaker, Joseph (1820-95), a publisher, born in London; began business on his own account as a theological publisher in Pall Mall and later in the Strand. He published, with Delph, *The Art of Living*, and started

is familiar

in 1868. He also produced *Reference Catalogue of Current Literature*, which is continued, and published a few devotional works.

Whitbread, Samuel (1758-1815), an English politician, the son of a London brewer. Having studied at Eton, Oxford, and Cambridge, he entered parliament in 1790 as Whig member for Bedford, and attaching himself to Fox became a leading spirit in opposition to Pitt's government. He headed the attack on Melville in 1805, and two years later introduced an elaborate Poor Law Bill, and adopted a peace policy, which resulted in a party split and the practical disbandment of the opposition in 1809. He disapproved of the Regency Bill in 1811, and having made the acquaintance of the Princess of Wales

He died by his own hand.

Whitburn: 1. A par. and vill., Durham, England, 3 m. N. of Sunderland; is a much frequented sea-bath resort. Pop. (1911) 3300. 2. A

and vill., 34 m. S coal and iron : 4455.

Whitby: 1. A seaport of the N. Riding of Yorkshire, England, at the Esk's mouth in the North Sea, 17 m. from Scarborough. The old and the new town (West Cliff) are connected by a swivel bridge. In its famous

A.D. by St. (d. c. 680) 7. was held. red by the and rebuilt cross was iory (1898).

Wooden shipwreck, rope and sail making are carried on. W. is noted for its jet manuf., and its fisheries are important. Pop. (1911) 11,139. See *History of Whitby* by Charlton (1779). Young (1817); Atkinson, *Memoirs of Old Whitby* (1891). 2. Cap. and port of entry of Ontario co., Ontario, Canada, on Lake Ontario, 27 m. N.E. of Toronto. It has a good harbour. Saddlery and hardware are among the manufs. Pop. 2300.

Whitby, Daniel (1638-1726), an English divine and commentator, born at Rushden in Northamptonshire. He became chaplain to the Bishop of Salisbury (1668), prebendary (1668), and precentor of Salisbury (1672), and wrote a number of tracts against popery. His *Protestant Reconciler* (1682), advocating concessions to the Dissenters, was publicly burned at Oxford. W.'s other works include: *A Paraphrase*

and *Commentary on the New Testament*, 1703, and *Last Thoughts*, 1727.

Whitchurch: 1. A tn. in Hampshire, 12 m. N. of Winchester, with agricultural interests. Shallons and serges are manufactured. Pop. (1911) 1935. 2. A tn. in Shropshire, 19 m. N.E. of Shrewsbury; with malt works. Pop. (1911) 5757.

White, Sir George Stewart (1835-1912), a British soldier, born at Ballymena, co. Antrim. In 1853 he entered the Royal Inniskilling Fusiliers. Became captain (1863) and exchanged into the Gordon Highlanders, of which he later became colonel. Served with great ability in the Indian Mutiny and in the second Afghan War (1878-80), showing conspicuous bravery on several occasions. Accompanied Lord Roberts to Kandahar. Was awarded the V.C., made lieutenant-colonel and soon afterwards colonel. Fought in the Sudan War of 1884-85 and in the Burmese Campaign of 1885. For his services in these wars he was made K.C.B. and major-general. In 1893 he succeeded Lord Roberts as Indian commander-in-chief, and in 1897 quartermaster-general of the forces. During the Boer War was unsuccessfully besieged in Ladysmith (1899-1900); was governor of Gibraltar (1900-4). See *Life* by Sir Mortimer Durand (1914).

White, Gilbert (1720-93), an English clergyman and naturalist, born in the village of Selborne in Hampshire, received his education at Basingstoke under Thomas Warton, and at Oriel College, Oxford. He became fellow of his college in 1744, and held curacies at Swarraton and Selborne. He accepted the living of Moreton Pinkney, a sinecure, in 1758, but lived near his native village of Selborne. Here his life became a round of tranquil observation of nature, and in 1789 he published *The Natural History and Antiquities of Selborne*, which had been in preparation since 1771.

White, Henry Kirke (1785-1806), a poet, born at Nottingham. Some contributions to a newspaper introduced him to the notice of Capel Lofft, by whose help he brought out a volume of poems, which gained him the friendship of Southey. Thereafter friends raised a fund to send him to Cambridge. Overwork, however, undermined his constitution and he died at twenty-one. Southey wrote a short memoir of him with some additional poems.

White, Hugh Lawson (1773-1840), an American politician, born in Iredell co., N. Carolina. He became district attorney at Knoxville (1807), judge of the Supreme Court (1809-15), and state senator (1807 and 1817). He

was one of the commissioners to settle the Spanish Claims (1821-24), and was elected to the United States senate (1825-35, 1836-46). See *Memoir* by Nancy Scott (1856).

White, Joseph Blanco (1775-1841), a British poet and theologian, born in Spain. Educated for the Roman Catholic priesthood, he came to England in 1810, and after studying theology at Oxford entered the Anglican Church, and finally became a Unitarian. He edited the Spanish monthly *El Español*, 1810-14; and *Las Variedades*, 1822. Among his chief works were: *Evidence against Catholicism*, 1825; *Second Travels of an Irish Gentleman in search of a Religion*, 1834; *Observations on Heresy and Orthodoxy*, 1835; and his *Autobiography with Portions of his Correspondence* (edited by Thom), 1845. His fine sonnet *Night and Death* first appeared in the *Bijou* (1828). W. also contributed to the *Quarterly*, *Westminster*, and *Dublin University Reviews*. See *Blackwood's Magazine* (July 1825), *Brit. Quarterly Review* (Aug. 1846), *Academy* (Sept. 12, 1891).

White, Richard Grant (1821-85), an American author, born at New York. Intended for the church, he studied at New York, but turning to journalism, he contributed literary articles to the *Courier and Enquirer*. During the Civil War he wrote for the *London Spectator*, being of great service to the Federal cause. His great distinction is as a Shakespearean scholar, his comments on the text being of great ability. See his *Studies in Shakespeare*, 1885.

White, Robert (1645-1704), an English engraver and draughtsman, pupil of D. Loggan. W. engraved the heading to the first *Oxford Almanack* (1674) and the title-plate to the *Hist. of Oxford Antiquities*. Vertue gives a long list of his portraits. His son, George (c. 1671-1734), was also an engraver and portrait painter. Both engraved portraits after Kneller.

White, William Hale better known as Mark Rutherford (c. 1830-1913), an English novelist, born at Bedford. His theological views preventing him from joining the Congregational ministry, for which he was intended, he entered the admiralty as a clerk, and rose to be assistant director of contracts. His works include: *The Autobiography of Mark Rutherford*, 1881; *Mark Rutherford's Deliverance*, 1885; and *The Revolution in Tanner's Lane*, 1887—a fine trilogy 'edited by Reuben Shapcott'; *Catherine Furze*, 1893, and *John Bunyan*, 1905. See his *Early Life and Autobiographical Notes*, published posthumously (1913).

Whitebait, the fry of herrings and sprats. In the winter and spring

young sprats form the great proportion of what is sold under the name, but in the summer, W. consists chiefly of young herrings. A W. dinner was customarily attended by cabinet members at Greenwich, and it was temporarily revived by Disraeli.

Whiteboys, a secret Irish patriotic association, formed about 1820, and belonging to the group known as Ribbonism. It was condemned by the Catholic clergy, but only Catholics could belong, and they were all of the lowest classes. Their aims and methods varied in different parts of the country, and the movement died down about 1855. The Westmeath Act (1871) declared Ribbonism illegal. See Sullivan, *New Ireland*.

White Caps, see **VIGILANCE SOCIETIES**.

Whitechapel, a parl. dist. in the E. of London, including the bor. of Stepney. It is one of the poorest and most squalid parts of London. The most notable buildings in it are the Tower and the London Hospital.

Whitefield, a residential tn. of Lancashire, 6 m. N.W. of Manchester, with cotton manufs. Pop. (1911) 6967.

Whitefield, Rev. George (1714-1788), the founder of the Calvinistic Methodistists, born at Gloucester, and educated at Oxford. W. was ordained a deacon by Bishop Benson (1736).

preaching made an extraordinary impression. After a visit to Gloucester and Bristol, he set off to join the Wesleys in America (1737). W. remained in America till towards the close of the year. He then returned with the view of raising subscriptions for an orphan-house in Georgia. Now began that course of preaching in association with Wesley which established Methodism as a popular faith. W. set the example of open-air preaching (1739) near Bristol. He repeatedly visited America, and traversed the whole extent of the British possessions. In 1748 he became known to Selina, Countess of Huntingdon, who made him one of her chaplains. This introduced him to the highest circles both of rank and literature in the metropolis. W. and Wesley quarrelled in 1741 about the great quest W. advocating W.'s printed work

of Clarke's *Commentary on the Bible* (1759), consist principally of sermons and tracts, a journal of his life and labours, and three volumes of letters. A collection of his sermons, tracts, and letters, in 6 vols., 8vo, was published at London in 1771.

White Flag, A, is carried in war as a sign of truce during hostilities, or as a token of surrender.

Whitehall, the main thoroughfare between Trafalgar Square and the Houses of Parliament. It passes through the main courtyard of the old Whitehall Palace (originally built by Hubert de Burgh in the reign of Henry III.), and is 150 ft. wide. Several public offices including the Treasury, Horse Guards, Admiralty, and War Office are at W.

Whitehall, a tn. of Washington co., New York, U.S.A., on Poutney R., and the Champlain Canal. It has railroad shops, silk and worst mills, lumber mills and machine shops. The tn. also owns and operates the water-works. Pop. (1910) 5869.

Whitehaven, a municipal and parl. bor., seaport and market tn., Cumberland, England, 41 m. S.W. of Carlisle; has extensive docks, collieries, iron-mines, breweries, tanneries, and stone-quarries. Pop. (1911) 19,018.

Whitehead, a seaport and vill., Guysborough co., Nova Scotia, Canada, on the Atlantic coast, 20 m. E.S.E. of Guysborough, is the first land seen by vessels bound for Canada. Pop. 500.

Whitehead, Charles (1804-62), an English poet and novelist, author of

The Solitary (1831), *as Autobiography* (1832), which led to the *Pick-*

In regular instalments by Dickens to Chapman and Hall the publishers. His novel *Richard Savage* (1842, new ed., 1896) was illustrated by Leech. Other works were: *The Earl of Essex*, 1843; *Smiles and Tears* (essays and stories, 1847); *Life of Raleigh*, 1851; and the unfinished *Spanish Marriage*. See Bell, *A Forgotten Genius*, 1884.

Whitehead, Paul (1710-74), an English satirist, born in London. While confined in the Fleet Prison for debt he wrote a number of political satires, and afterwards became one of the 'monks' of Medmenham Abbey. He was severely satirised by Churchill. His own works include: *State Dunces*, 1733; *Manners*, 1739; and *Gymnasiad*, 1744. See collected edition of his works, with *Life*, by E. Thomson (1777).

Whitehead, William (1715-85), a poet laureate, wrote verses and plays. Two of his tragedies, *The Roman Father* and *Cleusa*, were performed at Drury Lane in 1750 and 1751, respectively, and a comedy, *The School for Lovers*, in 1762. He was appointed poet laureate in 1757. His works were collected by William Mason (1788), who prefixed a memoir of his friend to the edition.

White Horse, Vale of the, see **BERKSHIRE**.

White Lady, a legendary spectre of

Teutonic tradition, said to appear in many of the German castles and elsewhere, by night or day, usually to presage the death of some member of the family. She is supposed to be the ancestress of the race and sometimes watches over the children at night. There are countless popular legends about W. L., who often appear to peasants and shepherds; they comb their hair, spin, disenclose treasures, and make gifts which turn into gold or silver. There is a W. L. in Scott's *Monastery*, and Scribe's *Dame Blanche* treats of the legend. The apparition is said to have appeared first in Bohemia in the 15th century as Dame Berchta, with whom other W. Ls. were identified.

White Lead, a basic carbonato of lead, having the formula $2\text{PbCO}_3 \cdot \text{Pb(OH)}_2$. The compound is manufactured by several processes, the simplest of which consists in grinding litharge with water and sodium bi-carbonate. The Dutch process by which the best quality W. L. is prepared is carried out by placing spirals of sheet lead in pots at the bottom of which is vinegar, and covering with spent tan or dung for four or five weeks. The vinegar gradually evaporates by the heat generated by the tan and attacks the lead, forming a basic acetate. This is converted to W. L. by the action of the carbon dioxide evolved from the decaying tan. W. L. is a heavy amorphous powder, which is used as a pigment. Although very poisonous and liable to blacken in the presence of sulphuretted hydrogen, it is used very largely, as no substitute has been found which possesses the same covering power or 'body.'

White Leg, 'Milk Leg,' or *phlegmasia dolens*, an inflammatory and dropsical disease of the legs, caused by obstruction of veins or lymphatics, and characterised by painful swelling and a white appearance. It usually occurs in females after parturition, a thrombus being formed either by the slowing of the circulation in the lower limbs, or by the passage of an infective clot from the region of the uterus. In some cases the lymphatics only are affected, in some the blood-vessels only, and in others both combined. The swelling may commence at the ankle and proceed upwards, or at the groin and proceed downwards. Little can be done except constitutional treatment and fomentations to relieve pain.

Whitelocke, Bulstrode (1605-75), an English lawyer, called to the bar in 1626. He sat for Stafford in parliament (1626) and for Great Marlow in the Long Parliament (1640). Siding with parliament on the outbreak of

Civil War, he became Commissioner of the Great Seal under Cromwell and his son. W. was sent to treat with Charles (1643-44), and on an embassy to Sweden (1653), negotiating the treaty of 1656. He opposed Cromwell's scheme for dissolving the Long Parliament (1653). On the Restoration W. was pardoned on payment of a fine. See his *Memorials* ... (1682, 2nd ed., 1732); *Journal of the Swedish Embassy* (Reeve's ed., 1855). Consult R. H. Whitelocke's *Memoirs*, 1860; Foss, *Judges of England*, 1870; Campbell, *Lives of the Lord Chancellors*, 1708.

White Mountains, a range of mountains in New Hampshire (N.E.), U.S.A., especially the Presidential range in Coos co. (S.), forming a detached portion of the Appalachian system. A tableland, 10 to 15 m. broad, separates the two main groups, the East or White Mts. and the Franconia (with Lafayette peak). Mt. Washington, the culminating peak, is over 6200 ft. high. There are fine waterfalls, and the wild scenery makes the district a favourite resort. See publications of the Appalachian Mountain Club.

White Pigments, see **PIGMENTS**.

White Plains, the cap. of Westchester co., New York, U.S.A., 12 m. from New York City, on the Bronx R. There are numerous public institutions, and fine golf and country clubs. Pop. (1910) 15,949. See *Hist. of Westchester co.*, by Scharf (1886), Shonnard and Spooner (1900).

White River, a river of Arkansas and Missouri, U.S.A., rising in N.W. Arkansas, running N.E. into S. Missouri, where it drains part of the Ozark plateau, and returning to Arkansas flows S.E. and S. to join the Mississippi. Total length about 800 m., navigable for steam-boats to Batesville.

White Sea, a gulf of the Arctic Ocean, N. Prussia. Its chief bays are Dvina (or Archangel) and Onega in the S., and Kandalá in the N.W. Into it flow the rivers Dvina, Onega, Vyg, and Mezen, and its chief port is Archangel. Herring, cod, and other fish are found in abundance. The sea is frozen over from September to May.

White Star Line, a line of steamships carrying weekly a transatlantic mail and passenger service between Liverpool and New York. The line is run by the Oceanic Steam Navigation Company, established in 1869 by Mr. T. H. Ismay. The first of these vessels was the *Oceanic*, launched in 1870. In 1883 new services were established with New Zealand and certain Chinese ports, and in 1899 with S. Africa and Australia. The company's vessels also visit Medi-

terranean ports, Boston, and Yokohama. The gross tonnage in 1910 was 372,045, and the number of vessels 31. Chief of the important passenger vessels recently built are the *Oceanic*, *Olympic*, and *Titanic* (q). The last-named vessel on her maiden voyage collided with an iceberg, was going at high speed and sank in less than three hours, with a loss of 1490 lives (April 1912). The ship was the finest of the kind and perfectly equipped. Its length was 882 ft. and breadth 92 ft., its gross tonnage 46,382 tons, and it was built at a cost of £1,175,000.

White Sulphur Springs, a popular watering-place in Greenbrier co., W. Virginia, U.S.A., situated among mountain scenery at an elevation of 1920 ft.

White Vitriol, see ZINC.

Whitewash, slaked lime which has been diluted with water to the consistency of milk. It is used for whitening walls, ceilings, and out-houses.

Whiteway, Sir William Vallance (1828-1908), a Premier of Newfoundland, born near Totnes, Devonshire. He went to Newfoundland in 1843 and was called to the bar in 1852, becoming Q.C. in 1862. From 1865-69 he was Speaker of the House of Assembly, and in 1873 became Solicitor-General in Carter's administration, succeeding him as Premier in 1878. This post he held until 1886, returning to power 1889-94 and 1895-97. He played a prominent part in the negotiations respecting the Newfoundland fisheries and French shore questions, and went to England four times as a delegate from the colony to the imperial government, but he is chiefly remembered as a promoter of railways in Newfoundland.

Whitford, a par. and vil. of Flintshire, Wales, 3 m. N.W. of Holywell, has coal-mines, lead and zinc works, and limestone quarries. Pop. (1911) 3219.

Whitgift, John (c. 1530-1604), an Archbishop of Canterbury, born at Grimsby. He was fellow of Peterhouse (1555), Lady Margaret professor of divinity, Cambridge (1563-67), master of Pembroke Hall and of Trinity College, Cambridge (1567-77), Dean of Lincoln (1571), Bishop of Worcester (1577), and Archbishop of Canterbury (1583-1604). He advocated the theories of Calvin, but supported Anglican ritual. He founded an almshouse and a fine grammar school at Croydon.

Whithorn (*Leukopibia* of Ptolemy), a royal bor. of Wigtonshire, Scotland, 12 m. S. of Wigtown, was the landing place of St. Ninian or Ringan, who

built a church called 'Candida Casa' (397), in which he was buried (432), and which was long a place of pilgrimage. Pop. (1911) 1170.

Whiting (*Gadus merlangus*), one of the members of the

extends into

slender in form

larger hake, differs from most of the other species of the genus in the absence of a barbel. It makes rapid growth, but rarely exceeds 20 in. in length, and is commonly taken much smaller.

Whiting, see CHALK.

Whitley and Monksheaton, an urban dist. of Northumberland, England, 2½ m. N. of N. Shields, is a seaside resort. Pop. (1911) 14,410.

Whitlow, a popular name for inflammatory affections of the finger characterised by painful swelling leading to suppuration. When the superficial involvement has attracted attention, as in the case of its side of its

charge of pus. If, however, the sheaths of the tendons or the periosteum are

inflammatory process. Deep abscesses, which are characterised by a throbbing pain, which is increased when the finger is allowed to hang down. Even if there is no indication of pus, the best treatment is to make a free incision and to dress the wound with antiseptics. Ws. are usually indicative of a low state of health generally.

Whitman, Wm. of Plymouth co., Mass. m. from N. York, wears blue boots, etc., etc.

Pop. (1910) 7292.

Whitman, Walt, originally Walter (1819-92), an American poet, a native of W. Hills, Long Is., was educated in the public schools of Brooklyn and New York. His early career was very varied, and he was apprenticed in turn to a doctor, lawyer, and printer. He then began teaching and contributing to the newspapers, was engaged as a carpenter and builder, and spoke on political questions. In 1846 he became editor of the *Brooklyn Eagle* and in 1847-48 he made long walking tours up the W. rivers into Canada. He found an outlet for expressing his democratic sentiments by writing verse, which he published in 1855 under the title of *Leaves of Grass*. The metre he employed was entirely original. He discarded the conventional laws of feet and rhyme, and

wrote in musical rhythmic sentences of varied length. He was accused of indecency and immorality for his frankness in speaking of subjects usually tabooed, and the book was banned in Massachusetts in 1881. While serving in the war of 1862-65 W. suffered from malarial fever, which ruined his health for life, and in 1874 he was obliged to resign a government post at Washington on account of his paralysis. He wrote of his experiences on the battlefield in *Drum Taps*, 1865, and *Memoranda during the War*, 1867. His other works include *Specimen Days and Collects*, a prose work, 1883; *Democratic Vistas*, 1870; and *November Boughs*, 1888. See his *Autobiography*, 1892; W. D. O'Connor, *The Good Grey Poet*, 1866; studies by Bueke, 1883; Binns, 1906; J. A. Symonds, 1906; and Basil de Selincourt, 1913.

Whitney, Josiah Dwight (1819-96), an American geologist, born at Northampton, Massachusetts, and educated at Yale. Travelled in Europe (1842-47); made geological survey of Lake Superior region (1847), reports being issued (1849-51). Investigated the U.S.A. mining interests (1853-54). In 1854 professor at Iowa, where he made another extensive survey; surveyed Missouri, 1858-60 (Report, 1862), and California, 1860-75 (Report, 1864-70). Professor at Harvard, 1865. Wrote many works on geological subjects, and papers for periodicals.

Whitney, William Dwight (1827-94), brother of above, an American philologist, born at Northampton; educated at Yale and Berlin. Studied Sanskrit, of which he became professor at Yale (1854). In 1870 professor of comparative philology at Yale. Edited many Sanskrit texts, and was recognised as one of the greatest Sanskrit scholars. Contributed to Böhtlingk and Roth's *Sanskrit Dictionary*. Wrote also grammars of German, English, and French, and many works on comparative philology.

Whitney Mount, a peak of the Sierra Nevada, S. California, named after J. D. Whitney, the famous geologist. It has an altitude of 14,099 ft. and is the highest peak in the U.S.A. proper.

Whitstable, a watering-place, Kent, England, at the mouth of the Swale, 6 m. N.W. of Canterbury, has famous oyster fisheries. Tankerton, a N.E. suburb, is a growing resort. Pop. (1911) 7984.

Whitsunday, or Pentecost, a festival of the Christian Church celebrated on the seventh Sunday after Easter to commemorate the descent of the Holy Ghost on the Apostles at that time. Its name is probably an abbreviation

of White Sunday, a name given to it on account of the white robes then worn by the newly baptised.

Whittier, John Greenleaf (1807-92), an American poet, was the son of a New England farmer. He was for a time a shoemaker, but afterwards took up journalism, and amongst other papers edited the *American Manufacturer*. In 1831 he produced his first volume of poems, *Legends of New England*, which secured his reputation as a poet, and also won popularity for its abolition sentiment. Further works of his were: *Lays of my Home*, 1843; *Voices of Freedom*, 1846; *Songs of Labour*, 1850; and *National Lyrics*, 1865.

Whittington, Richard (d. 1423), Lord Mayor of London, the son of Sir William Whittington, was a London mereer, who held several municipal offices, and was thrice Lord Mayor of London (1397, 1406, and 1419). Around him has been written a legend, but there is probably no basis in fact for it.

Whittington and Newbold, or Newbold and Dunstan, an urban dist. of Derbyshire, England, 2 m. N. of Chesterfield, has collieries, iron-works, brick-works, and manufactures of earthenware. Pop. (1911) 17,218.

Whittlesey, or Whittlesea, a market tn. of Cambridgeshire, on the Nen, near Wisbeach. It has brick manufactures. Pop. (1911) 4207.

Whitwick, a par. and tn. of Leicestershire, England, 5 m. E. of Ashby-de-la-Zouch, has coal-mines and hosiery manufactures. Pop. (1911) 3800.

Whitwood, an urban dist., W. Riding, Yorkshire, England, 4½ m. N.W. of Pontefract; manufactures earthenware, tiles, and bricks. Pop. (1911) 5518.

Whitworth, an urban dist., S.E. Lancashire, England, 3 m. N. of Rochdale; has coal mines, slate quarries, and cotton mills. Pop. (1911) 8872.

Whitworth, Sir Joseph (1803-87), a British engineer, born at Stockport. After serving his apprenticeship as a mechanic, he set up in 1833 as a tool-maker in Manchester, and made experiments in rifles, cannons, and other ordnance. The Whitworth rifle was invented in 1857, and was adopted by the National Rifle Association in 1860 and by the War Office in 1869. He founded thirty scholarships in the science and art department for the encouragement of engineering science. His business became a limited liability company in 1874, and amalgamated with the firm of Armstrong of Elswick in 1897.

Whooper, see SWAN.

Whooping-cough, an infectious

disease of childhood characterised by spasms of coughing, consisting of a violent expiration followed by a strong inspiration, causing the 'whoop.' It is a micro-organism which has not yet been identified. There is, however, no doubt about its infective nature, and efforts should be made to disinfect all expectoration in order to prevent the spread of the disease. W. is most common among children under five years of age, and it is to be regarded as a particularly dangerous disease, not only on account of the high rate of mortality, but because it is apt to leave an enfeebled state of the system, especially of the respiratory organs. The disease is ushered in by catarrhal symptoms which are not to be distinguished from an ordinary cold. In from one to two weeks the paroxysmal cough stage is entered upon. Each paroxysm lasts rather less than a minute; the coughs succeed each other rapidly and alternate with whooping inspirations. The air-passages are much distended, and the child looks as if it is about to suffocate. The paroxysm often ends with vomiting, after which the child appears exhausted but free from pain. The paroxysmal stage may last from three to six weeks, after which there is a stage of decline. The paroxysms are more infrequent, and the symptoms generally are less intense. Possible complications are pneumonia, emphysema, hernia, cerebral hæmorrhage, etc. The treatment consists of careful attention to the general health. Atropine has been found useful in relieving the spasm, though it has no effect on the duration of the disease. In warm weather the child should be allowed to go out, and during convalescence open-air treatment in a mild climate is beneficial.

Whortleberry, *Bilberry*, *Blueberry*, *Whinberry*, or *Huckleberry* (*Vaccinium myrtillus*), a small shrub with drooping wax-like, flesh-coloured flowers, followed by dark blue berries of an agreeable flavour. The red W., or cowberry (*V. vitis-idaea*), occurs on mountainous heaths and bears red berries. The marsh W., or cranberry (*Oxycoccus palustris*), is a prostrate plant with dark red berries and occurs on peat bogs.

Whydah, see **WHIDAH**.

Whympor, Edward (1840-1911), an English artist, author, and explorer. He travelled among the Central and Western Alps (1860) to obtain sketches of Alpine scenery, and ascended Mont Pelvoux (1861). His ascent of the Pointe des Miroirs with a party (1864) was a remarkable mountaineering feat. W. also attended the Aiguille

Verte and the Matterhorn (1865). He next visited Greenland (1867, 1872), Ecuador and the Andes (1879-80), and Canada (1901-5). Among his works are: *Scrambles among the Alps*; *Travels amongst the Great Mountains of the Equator*, *Supplementary Appendix . . . and How to use the Aneroid Barometer* (1891-92); *Chamonix and Mont Blanc and The Valley of Zermatt and the Matterhorn* (new ed.), 1901. The British and South Kensington Museums contain specimens of his botanical collections from Greenland and S. America. See *Heer in Trans. of Roy. Soc.* (1869).

Whyte-Melville, George John (1821-78), an English novelist and soldier, born at St. Andrews and served in a Turkish cavalry regiment through the Crimean War. In 1850 he began his literary career by writing sporting novels, chief of which are *Digby Grand*, 1853; *General Bounce*, 1855; *The Queen's Marys*, 1862; *Salanella*, 1873; and *Black but Comely*, 1879. He also wrote *The Gladiators*, *Songs and Verses*, and *The True Cross*. He died from an accident in the hunting-field.

Warton, a tn. Bruce co., Ontario, Canada, on Colpoys Bay, 20½ m. N.W. of Owen Sound; manufactures lumber, furniture, and cement. Pop. 2500.

Wiborg, see **VIBORG**.

Wichita, the co. seat of Sedgwick co., Kansas, U.S.A., the second city in the state. It stands in the centre of a farming and agricultural district. Pop. (1910) 52,450.

Wichita Falls, a tn., Wichita co., Texas, U.S.A., on the Wichita R., 95 m. N.W. of Fort Worth; exports grain. There are oil wells in the neighbourhood. Pop. (1910) 8300.

Wick, a tn. and co. tn. of Dumfriesshire, N. of Scotland, at the mouth of the River Nidd. It has an extensive herring fisheries and a good harbour. Pop. (1911) 9086.

Wickham, a tn., suburb of Newcastle, New South Wales, Australia, at the mouth of the Hunter R. Pop. 8000.

Wickliffe, see **WYCLIFFE**.

Wicklow: 1. A maritime co., prov. Leinster, Ireland; bounded on the N. by Dublin, S. by Wexford, E. by St. George's Channel, and W. by Carlow and Kildare. The county is famous for its beautiful scenery. Running through the centre from N. to S. are the Wicklow Mts., with the heights of Lugnaquilla (3039 ft.), Kippure (2473 ft.), and Duff Hill (2369 ft.), between which lie many fine gorges and valleys. The coast is a succession of steep cliffs and is dangerous for navigation; Wicklow

Harbour is the only inlet of importance. The principal rivers are the Slaney and Avoca, the last named running through the Vale of Avoca and formed by the famous 'Meeting of the Waters' of the rivers Avonmore and Avonbeg; the Liffey and Vartry, the valley of the latter containing the reservoirs of the Dublin waterworks. The county is noted for its lovely glens, of which the best known are Glendalough, Dargle, Glennalur, and the Devil's Glen. Granite is quarried in the W., and gold, copper, and lead are found. Agriculture is not very flourishing, sheep and cattle are reared in increasing numbers, and pasturage occupies the greater part of the cultivated land. Oats and potatoes form the main crops. The chief towns are Wicklow (the county town), Bray (7424), and Arklow (4944). The county comprises eight baronies and returns two members to parliament. In the Vale of Glendalough are the ruins of the 'seven churches,' and there are other monastic remains, besides several castles. The area is 500,216 acres. Pop. 60,824. 2. A seaport, market tn., and co. tn. of co. Wicklow, Ireland, 31 m. S.E. of Dublin. Its chief importance is due to the harbour, built to accommodate large vessels, with two fine piers. Trade is carried on in coal, timber, iron, and slate, which form the chief imports, while grain is the principal export. There are large chemical works. There are ruins of a 13th century monastery and part of the parish church dates from the Norman period. Pop. 3288.

Widgeon, Wigeon, or *Mareca penelope*, a duck which visits Britain in winter, usually breeding farther N. It is about 18 in. long. The plumage is grey and brown pencilled with black, the head and neck reddish chestnut, the underparts white. Its flesh is valued for the table. The American W. (*M. Americana*), is a larger bird and has occasionally reached Britain.

Widnes, a tn. and municipal bor. of Lancashire on the Mersey, with manufactures of chemicals, soap, and iron. Pop. (1911) 31,544.

Widow. *Legal rights*.—On the death of her husband, intestate, the W. is entitled to half his personal property unless there be surviving also a child or grandchild, when she takes one-third and one-third of his real estate; and she is also entitled to the grant of letters of administration of his whole estate, though the court may in its discretion make the grant to the next-of-kin instead or to both the W. and the next-of-kin jointly. W.-bench by a Sussex custom meant

the share a W. was entitled to of her husband's estate, over and above her jointure. The term *widow's chamber* denoted the apparel and furniture of the bed-chamber of the W. of a freeman of London, to which she was once entitled. See also TERCE, JUS RELICTÆ, DOWER, and SATI.

Wied, William Frederiek Henry, Prince of (b. 1876), born at Nenwid, second son of the fifth prince of Wied, by his marriage with Marie, Princess of the Netherlands, nephew of Queen Elizabeth of Roumania ('Carmen Sylva'), great-grand-nephew of Emperor William I. of Prussia, chosen by the powers in Nov. 1913 to be first sovereign ruler of Albania. Entered the Guards Regiment in Berlin and later appointed captain in the great general staff. Until five years ago it was arranged that in the event of Queen Wilhelmina of Holland dying without issue he should be King of the Netherlands. In 1898 he married Princess Pauline of Württemberg, by whom he has two sons.

Wieland, Christoph Martin (1733-1813), a German author, the friend of Goethe, Schiller, and Herder, was born near Biberach in Württemberg, the son of a Swabian pastor. While still at the University of Tübingen, he published a didactic poem *Die Natur der Dinge* (1751), which was followed by works of like seriousness, such as *Die Kunst der Tugend* (1753) and *Die Kunst der Wissenschaft* (1755).

Meanwhile, he accepted various tutorships until, in 1760, he was appointed director of the Chancery of Biberach. He then published a translation of Shakespeare, the first issued in German (1762-66), and wrote some delightful prose romances: *Araspe und Panthea* (1761), *Don Sylvio von Rosalba* (1764), and *Agathon* (1766). His most important contributions to German poetry are *Musaria* (1768), *Idris* (1768), *Der Neue Amadis* (1771), and *Oberon* (1780). He was appointed professor of philosophy and literature at Erfurt (1769-72) and then became tutor to Prince Charles Augustus at Weimar. His famous prose romance, *Der Goldene Spiegel*, appeared in 1772, and its sequel, *Der Danishmend*, in 1775. W. also wrote operas and edited *Der Teutsche Merkur* (1773). Complete editions of his works appeared in 1818-28 and in 1900. See Lives by Gruber (1818), Döring (1846), and Senffert (1900).

Wieliczka, a tn. of Austrian Galicia, in the circle of Bochnia. It is remarkable for its celebrated salt-mine, which extends under the whole town and to a considerable distance beyond it on each side. Pop. 7150.

Wiener-Neustadt, a tn., Lower

Austria, 31 m. by rail S. of Vienna; has manufs. of ammunition, engines, textiles, pottery, and leather. The old castle (12th century) was converted into a military college (1752). Pop. (1911) 32,869.

Wienerwald, a mountain range of Lower Austria, a branch of the Noric Alps, includes the peaks of 'Hoher Lindkogel' (2780 ft.), near Baden, Hohenstein (2120 ft.), Knhlenborg (1400 ft.), and Leopoldsberg (1380 ft.), all near Vienna.

Wiesbaden, the cap. of the duchy of Hesse-Nassau on the N. slopes of the Taunus range, has sulphurous springs which have made it a world-famous watering-place. Pop. 109,000.

Wiesen, a health resort for pulmonary complaints, Grisons canton, Switzerland, at an alt. of 4771 ft., 12½ m. S.W. of Davos.

Wife, see HUSBAND AND WIFE; MARRIAGE AND MARRIAGE LAW.

Wiffen, Benjamin Burron (1794-1867), an English biographer, of Quaker parentage, brother of Jeremiah Holmes W. (librarian at Woburn Abbey and translator of Tasso). He visited Spain with G. W. Alexander (1839, 1842), and was a friend of Luis de Usoz y Rio, with whom he worked to make known the writings of early Spanish reformers. W. helped to produce *Obras Antiguas de los Españoles Reformados* (1847-65), and wrote biographies of Juan Perez, Junn de Valdes, and others. Selections of his poems appeared in Pattison's *The Brothers Wiffen*, 1880. See Boehmer *Bibliotheca Wiffeniana*, I., 1874.

Wig, the use of Ws. is probably so old that no historian can assign any precise date of origin, though it may be otherwise with regard to particular styles of Ws. The Emperor Otho is said to have worn a W. which was so well made that it could not be distinguished from natural hair, and there is evidence in Ovid that the Roman ladies wore blond wigs to enhance their charms. In France they appear to have been worn even before the middle ages, though according to Mézeray they were not introduced until the reign of Louis XIII. They were probably not common in England before the Tudor period, but thereafter became the height of fashion. It was only during the latter half of the 18th century that Ws. passed out of general use except in the professional classes. Physicians, says Lecky, discarded their grent Ws. and assumed what Boswell called the 'levity of bag wigs.' The same historian tells us that in 1765 the perriquet makers had become so depressed in their calling that they presented a petition to the King 'complaining bitterly of the growing cus-

tom of gentlemen wearing their own hair, employing foreigners to dress it,' and begged the king to discountenance such usages by his example. Some of the most notable types of Ws. were the *Blenheim*, so named after the battle; the *cauliflower*, a powdered curled wig much in vogue in the time of Benu Nash; the *full-bottomed* W. worn by judges on ceremonial occasions.

Wigan, a market tn., parl. and municipal bor. of Lancashire, England, 40 m. S.E. of Lancaster on the R. Douglas. It is an ancient place, divided by the river into two parts. Its chief industry is the manufacture of cotton, but it also makes chemicals, soap, iron and brass goods. Pop. (1911) 89,152.

Wight, Isle of, an island off the coast of Hampshire, in which county it is included, in the English Channel, separated from the mainland by the Solent and Spithead. Area 147 sq. m.; greatest length 23½ m.; greatest breadth 13 m. It has chalk cliffs and downs, the highest elevation being St. Boniface Down (787 ft.). Off the W. coast are the rocks known as the 'Needles.' The scenery of the I. of W. is very picturesque, with its narrow ravines or 'chines' and rivalets. The climate, too, is pleasant and healthy, and the sea-bathing excellent, so that the Isle is a great favourite with holiday makers. The most important towns are Newport (the n. Ventnor. Pop. (1911) 1,000) and on's The

Isle of Wight, 1911.

Wigston Magna, a par. and vill., Leicestershire, England; has framework knitting industries and railway workshops. Pop. (1911) 8652.

Wigton, a par. and market tn., Cumberland, England, 11½ m. S.W. of Carlisle; manufs. join and cloth. Pop. (1911) 3687.

Wigtown, a peninsular co. in the S.W. corner of Scotland, is divided into three districts—the Machars, or low country, lying between Wigtown and Luce Bay; the Rhynns, which comprehends the portion to the W. of a line drawn between Luce Bay and Loch Ryan; and the Moors, which includes the remainder. The climate is salubrious, although the rainfall is considerable. Nowhere does the land rise to a great elevation and there are no considerable rivers. The Cree and the Bladenoch are both navigable for a certain distance. The principal towns are Stranraer, Wigtown, and Newton. Area 311,609 acres.

Wigtown, a market tn., royal and parl. bor. of Scotland, cap. of Wigtownshire. The inhabitants are

mainly engaged in fishing. Pop. 1329.

Wigwam, the hut or cabin of N. American Indians, which consists of a rough conical framework of poles stuck into the ground below and converging above, covered with bark, matting, or tanned hides, with an aperture at the top for the exit of smoke. W. is the English corruption of *wekou-om-ut*, 'in his house.'

Wl-ju, a walled tn. in Phŷŷng-an prov., N.W. Korea, near the Yalu estuary; opened to foreign trade in 1911. Pop. 30,000.

Wilberforce, Samuel (1805-73), hlshp of Winchester. He upheld the traditions of the Anglican orthodoxy during the days of the Tractarian movement and the secession to Rome of men like Newman and Manning. He published *Euchoristica*, 1839; *Agathos*, 1840; and *The History of the Protestant Episcopal Church in America*, 1844.

Wilberforce, William (1759-1833), a philanthropist, entered parliament when he attained his majority, and soon became on intimate terms with the leading statesmen of the day, with most of whom he corresponded. He was to the fore in many philanthropic movements, but the great work of his life was in connection with the abolition of slavery, of which cause he assumed the leadership in 1787. It was not until twenty years later that his dream was realised, and a Bill received the royal assent. He was associated with societies for the suppression of vice, the Bible Society, and many missions. There is a Biography by his sons, Robert and Samuel (1838).

Wild, Jonathan (c. 1682-1725), a notorious English thief, born at Wolverhampton, who organised a band of thieves and opened offices in London for the restoration of the property which his own employees had stolen. He was arrested and hanged at Tyburn. His fame lives in Fielding's novel, *The Late Mr. Jonathan Wild the Great*, 1743.

Wildbad, a watering-place, Wŷrtemberg, Germany, in the Enz ravine of the Black Forest, 14 m. E. of Baden-Baden; has thermal alkaline springs and baths. Pop. 4000.

Wild Birds Protection Acts. These Acts (passed in 1880, 1881, 1894, 1896, 1902, 1904, and 1908) provide a close time, namely between March 1 and Aug. 1., for shooting, trapping, or attempting to shoot any wild bird, together with penalties for non-observance of such close time. It is an offence to expose for sale any wild bird taken in the close season, provided it be exposed for sale *recently* after being so taken. The Schedule to

the Act of 1880 contains a list of wild birds specially protected, and as to these it is an offence in any one to disregard the close season. But an owner or occupier of land (or a person authorised by an owner or occupier) commits no offence by shooting wild birds on his land which are not included in the Schedule. A Secretary of State is empowered under the Acts, on the application of a county council, to make an order prohibiting the taking or destruction of eggs of wild birds within local limits and periods specified by the order. There is also an important provision against setting up on poles, trees, or cairns any spring or trap calculated to injure wild birds. It is to be observed that the list of protected birds and the close seasons vary in different counties, with the result that it is impossible without looking into existing local orders to say precisely what the law is as to the killing of any particular bird in any particular locality. A list of the various orders up to March 15, 1912, will be found in *Oke's Game Laws*.

Wild Boar, see BOAR.

Wilde, Jane Francisca (*née* Elgee), Lady (1826-96), an Irish writer, wife of the Irish surgeon, Sir William (1815-76), and mother of Oscar (1856-1900). She wrote *Poems* (1864) under the pseudonym of 'Speranza,' her other works including: *Notes on Men, Women, and Books*, 1891; *Driftwood from Scandinavia*, 1884; *Legends of Ireland*, 1887; *Social Studies*, 1893, and other pamphlets, and contributions to *The Nation*, 1845-48. Her 'salon' in Dublin was much frequented, but after her husband's death she settled in London, and was buried in Kensal Green cemetery.

Wilde, Oscar O'Flahertie Wills (1856-1900), a dramatist and essayist, was the younger son of Sir William W., the Dublin surgeon, by his wife, *née* Jane Francisca Elgee, who attained notoriety in literary and political circles for her writings over the signature, 'Speranza.' Educated at Magdalen College, Oxford, W. there founded an æsthetic cult, for advocating which he was generally laughed at. He became famous when Gilbert parodied him as Archibald Grosvenor in *Patience*. In 1882 he went to America and lectured on æsthetic philosophy. He had already, in 1881, published a volume of poems, which, in spite of affectations, attracted attention by their finish and the music of the verso. It was seven years later when he issued *The Happy Prince and Other Tales*, the fairy story that gave its name to the volume being exquisite. *Lord Arthur Savile's Crime, and other Stories*, and his only

novel, *The Picture of Dorian Gray*, both appeared in 1891. It is probably as a dramatist that W. will ultimately be remembered, and, with the exception of *Salome* (1893), his successes were made in the realm of light comedy, where he could give full play to his fantastic wit. *Lady Windermere's Fan* (1892), *A Woman of no Importance* (1893), and *The Ideal Husband* (1895) were each and all successful, but his masterpiece was that 'moral comedy for serious people,' *The Importance of being Earnest* (1895), which places him in the same rank with Goldsmith and Sheridan. His last works were *The Ballad of Reading Jail*, 1898, and *De Profundis* (posthumous, 1905). See *Life* by Sherrard.

Wildebeest, see Gnu.

Wildenbruch, Ernst Adam von (1847-1909), a German poet, dramatist, and novelist, born at Beirut, in Syria. He served in the Prussian army through the campaigns of 1866 and 1870-71, was appointed judge at Frankfurt, and having entered the state service 1877, became privy councillor of legation (1897). His chief plays, reflecting the patriotism of young Prussia,

poet is found in *Sedan*, 1875; *Lieder und Gesänge*, 1877; and *Dichtungen und Balladen*, 1884.

Wilderness, a desolate region S. of the Rapidan R., in Virginia, U.S.A., 15 m. W. of Fredericksburg, where a battle of the Civil War was fought under the command of the rival generals, Grant and Lee.

Wilfrid, St. (634-709), a bishop of York, was a Northumbrian by birth, and was educated in the monastery at Lindisfarne. W. supported the Roman party in the Synod of Whitby in 664, and was consecrated bishop in the same year. He appealed to Rome against Ælfrid of Northumbria, and on his return to England (681) was shipwrecked off Frisia, where he made many converts.

Wilhelmshaven, a military port and seaside-resort of Hanover prov., Prussia, on the N.W. shore of the Jade Busen, 18 m. from Bremerhaven. It is the station for the German North Sea fleet, and has a fine harbour for war-vessels and slips for trading vessels. The territory was acquired from Oldenburg (1853). There are extensive docks, moles, foundries, naval stores and workshops, boiler-works, a signalling-station, and a meteorological observatory. Pop. about 26,010. See von Krohn, *Vierzig Jahre in einem Deutschen Kriegshafen*, 1905; Eberhard, *Führer Durch Wilhelmshaven*, 1906.

Wilhelmshöhe, see Kassel.

Wilkau, a vil. of Saxony, Prussia, S.E. of Zwickau, has iron-foundries. Pop. 8300.

Wilkes, Charles (1801-77), a naval officer, born in New York. Entered the navy 1816, appointed to the *Dépôt of Charts and Instruments*, Washington, 1830. Commanded an exploring expedition from 1838-42: surveyed the Samoan group, discovered many islands, and the Antarctic continent. In 1861 he commanded the steamer *San Jacinto*, and forcibly removed from the British mail-steamer *Trent* Messrs. Mason and Slidell, commissioners of the Confederate States to England and France. He commanded a squadron in W. Indies, and was made rear-admiral, 1866. He wrote *Narrative of U.S. Exploring Expedition: Western America; Theory of the Winds*, etc.

Wilkes, John (1727-97), a politician, was in early life a dissolute man, and was one of the fraternity of Medmenham monks. He entered parliament in 1757, and was later active in opposition to Bute. He founded in 1762 *The North Briton*, to which Charles Churchill was a valuable contributor, and in the following year was arrested for a libel uttered in the famous No. 45. He was found guilty but pleaded privilege as a member of parliament. He was expelled from Westminster in 1764, and went abroad for four years. After his return he was elected member for Middlesex, but was expelled in 1769 for another libel. He was thrice returned for Middlesex, but was not allowed to take his seat until 1790. In 1774 he had been elected Lord Mayor of London, and from 1779 until his death was city chamberlain. His correspondence was published by John Almon in 1805. There are biographies by Fraser Rae and Percy Fitzgerald.

Wilkes-Barre, a co. seat of Luzerne co., Pennsylvania, on the Susquehanna R., in an anthracite coal mining district. Pop. (1910) 67,105.

Wilkie, Sir David (1783-1841), a Scottish painter, born at Cultra, in Fife, he studied art in Edinburgh and then went to London, where his pictures soon began to attract notice. In 1811 he was made R.A., and in 1825 he travelled in Spain, while shortly after his return to England he was appointed painter to the crown, and in 1836 he was knighted. Four years later he visited Turkey and Palestine, and, dying on board ship while on his way home, he was buried at sea near Gibraltar.

Wilkins, Sir Charles (c. 1749-1836), an English Orientalist, served the E. India Co. in Bengal (1770), learning

Sanskrit, Persian, Arabic, and other tongues. He established a printing-press for Oriental languages (1778), and with Jones founded the Bengal Asiatic Society (1784). His translations from the Sanskrit include: *Bhagavad-gita*, 1785; *Hitopadesa*, 1787; and the *Story of Sakuntala* (from the Hindoo epic *Mahabharata*), 1793 and 1795. He re-edited *Richardson's Persian, Arabic, and English Dictionary*, 1806, and published a *Sanskrit Grammar*, 1809. *W. Examiner* and. (1805-36). See

Wilkins, John (1614-72), an English scientist and divine, Bishop of Chester from 1668. He was made warden of Wadham College, Oxford (1648), sided with parliament during the Civil War, and married Cromwell's sister, Robina (1656). W. helped to found the Royal Society (incorporated 1662) and was its first secretary. His works include: *Discovery of a New World*, 1638; 3rd ed. 1640; *Discourse Concerning a New Planet*, 1640; *Mathematical Magic*, 1648; *Essay towards a Real Character and a Philosophical Language* (his chief work), 1668. See Burnet, *Hist. of his Own Times*; *Diaries of Evelyn and Pepys*; *Life by Angiers, Willughby; Whewell, Ind. Sc.*, I.; Wright Henderson, *Life and Times of J. Wilkins*, 1910.

Wilkins, Peter, see PALTOCK, ROBERT.

Wilkins, William (1778-1839), a British architect, born at Norwich. He became architect to the E. India Company and professor of architecture at the Royal Academy (1837). His principal buildings include University College, London, the National Art Gallery, and Hulsebury College.

Wilkesburg, a bor., Allegheny co., Pennsylvania, U.S.A.; is practically an eastern suburb of Pittsburg. Pop. (1910) 18,924.

Wilkinson, James (1757-1825), an American soldier, born in Benedict, Maryland. He entered the American service in 1775, fought outside Boston and at La Chine, serving in turn under Arnold and Gates, and was clothier-general of the Continental army (1779-81). He was twice court-martialled (1807, 1814), but though acquitted at the time facts have since proved him to be a traitor.

Wilkinson, James John Garth (1812-99), an English Swedenborgian and miscellaneous writer, born in London. He practised in London as a homoeopathist, and wrote on medicine, philosophy, and law. His chief works are: *Emanuel Swedenborg*, 1849; *Improvements from the Spirit*, 1857; *Human Science*, 1876; and *Epidemic Man and his Visitations*, 1892. He

also edited Blake's *Song of Innocence* in 1869.

Will, in psychology, 'covers all active mental operations, all our doings, such as walking, speaking, attending to things, together with efforts to do things, active impulses and resolutions.' Thus W. forms one of the three sides of Mind—Feeling, Knowing, and Willing, and for their connection and opposition the reader is referred to EMOTIONS. By simply noting that the first actions are bodily, simple, and external, and are merely responses to sense-impressions, while the later ones are complex, internal, and representative, e.g., choosing, it can be seen that the laws governing the growth of will are the same as those which govern intellectual development, and these are outlined in EMOTIONS (q.v.), these being exercise, retentiveness, and association. W. is usually divided into *external* and *internal*, the former including muscular action and the latter mental action and voluntary attention or concentration. Yet although these are separate branches, they are interdependent, for attention involves muscular activity and voluntary movement attention; while in complex processes, e.g., choosing, attention plays a great part. Early movements may be divided into *random movements*, which result from the excitation of motor centres, and are not preceded by any conscious element, and *reflex movements*, which result from sensory stimulation. Examples of the first class are the movements of the legs and arms of babies; of the second, the closing of the fingers of an infant on an object placed in its hand. Neither of these show any psychical accompaniment, but *instinctive movements*, e.g., the sucking of an infant, while closely analogous to reflex movements, seem to possess some element of desire or striving to an end. Bain has shown that *random movements* are the commencement of the development of voluntary movement, while Spencer and others take *reflex movements* as the initial stage. The individual differences of W. depend chiefly upon keenness of desire, and beyond this upon the power of the disposition to act. Self-control implies W., and by many this is considered to be different from the earliest forms, for it involves a force which can overcome desire and aversion. This immediately leads to the question of the nature of free-will, or deliberative choice. This function is evidently the highest form of the activity of the W. Popularly free-W. means a W. 'unfettered by imposed restraint or compulsion in any form.' Philosophy

has built upon this the idea that in choice-accompanied action the result may be undetermined, and not always determined by desire or aversion. That is, the W. is self-determining, and may lead action away from the strongest desire. This may be said to be a metaphysical doctrine, since it implies a theory respecting the nature of the mind and the ego in itself as an active principle, so leading to questions concerning power and causality (q.r.). See DETERMINISM, KANT, LOTZE, HERBERT, DESCARTES, SCHOPENHAUER, SIDGWICK, CALVIN, HUME, HOBBS, and BAIX. Read Sully, *Handbook of Psychology; The Human Mind* (2 vols.).

Williamette, a riv. of Oregon, U.S.A., formed by the union of the Coast Fork and Middle Fork. It has a northern course and enters the Columbia R. in Columbia co. in the north-western part of the state. It has a length of 200 m., and is navigable for large steamers to Portland.

Willan, Robert (1757-1812), an English physician; educated at Sedbergh Grammar School and at Edinburgh. He took his medical degree in 1780, and became physician at the Public Dispensary of Carey Street, London, in 1783. W. made a careful classification of diseases of the skin, for which he received the Fothergillian gold medal (1790). His *Description and Treatment of Cutaneous Diseases* (1798-1808) was completed by Dr. Ashby Smith (1814). See Munk's *Coll. of Phys.*; Bateman's *Memoir in Edinburgh Med. and Surg. Journ.*, xxxii.

Willard, Frances Elizabeth (1839-98), an American writer and educationist, was born at Churchville, New York, and educated at the North-Western Women's College at Evanston, where she became professor and finally dean. She was also president of the Woman's Christian

Association (1879), and wrote:

.....; *My Happy*
See *Life by*

Witts, 1898.

Willdenow, Karl Ludwig (1765-1812), a German naturalist, studied medicine at Halle, becoming professor of natural history at Berlin (1798), and director of the Botanical Garden (1806). He published a new edition of Linnaeus's *Species Plantarum* (1798-1800).

Willmann (Lina C.), 1817, *On the Life of Butterflies in Brandenburg Mark. See Schlachtendahl, Leben; Edinburgh Review* (July and Oct., 1807).

Wille, Johann Georg (1715-1808), an engraver; a Hessian by birth, he went while a boy to Paris, and spent the

greater part of his life there, sharing lodgings for a while with Diderot. Among his engravings is a famous one after Louis le Tocque's portrait of Prince Charles Edward Stuart, while he also perpetuated various works by Gerard Dou and Terborch, and he wrote a volume of *Mémoires* (Paris, 1857) which constitutes an historical document of some moment. See Dilke, *French Engravers of the Eighteenth Century*, 1902.

Willonis, Florent (1823-1905), a Belgian artist, born at Liège. He studied at the Mechlin Academy and in 1844 settled in Paris. He was inspired by the work of old Dutch masters, and drew his subjects chiefly from indoor domestic life.

Willemstad, a tn. and cap. of Curaçoa, Dutch W. Indies, on St. Ann's Bay, on the S. coast, has a trade in sugar, tobacco, and blue phosphates. Pop. 9000.

Willenhall, an urban district and tn. of Staffordshire, England, 3 m. E. of Wolverhampton, has coal-mines, iron and brass foundries, manufactures of locks, bolts, and bicycle castings. Pop. (1911) 18,858.

Willerden, an urban dist. of Harrow div., Middlesex, England, 7 m. from St. Paul's, London, 1 m. from W. Junction. W. Green, Cricklewood, and Neasden (N.) are adjoining districts. Kilburn and Brondesbury lie to the E., and Harlesden to the S. St. Mary's Church has Norman remains. Pop. (1911) 151,214.

William I., surnamed The Conqueror (1027-87), King of England, was a natural son of Robert II., Duke of Normandy, but in spite of the banishment, succeeded to his father's duchy in 1037, and effectively upheld his position, though he had to fight to do so. In 1064 Harold, then Earl of Wessex, and afterwards king of the English, was shipwrecked off Portland and captured by William, who only released him on his promising to support W.'s claim to succeed to the English throne on the death of Edward the Confessor, who had undertaken to nominate him as his successor. On the death of Edward in 1066 Harold broke his word and ascended the throne. W. without delay invaded England. He landed at Pevensey, near Hastings, on September 28, and on the following October 11 met and defeated the home army at a place since called Battle, in which encounter Harold was killed. Within the next few years he quelled rebellions in various parts of the country. In 1072 he invaded Scotland and compelled Malcolm to pay homage to him. Three years later he went to Normandy to suppress insurrections that sprang up during

his absence. He met with his death as the result of an accident when riding. W. the Conqueror was a brave man, a capable soldier, and an able administrator. It was during his reign and at his instance that the survey was made, the results of which were entered in the Domesday Book.

William II., commonly known as William Rufus (1056-1100), King of England, was the third son of William the Conqueror, and succeeded to the throne on the death of his father in 1087. His eldest brother, Robert, was Duke of Normandy, and in 1091 W. invaded the duchy, but being granted certain rights, co-operated with Robert against his French neighbours. W. was cruel and grasping, and hated by his subjects, who certainly did not mourn his death, which resulted from his being shot by Walter the Forest.

William III. (1702-1707), King of England, Scotland, and Ireland, was the posthumous son of William II., Prince of Orange and Mary, daughter of Charles II. and Princess Royal of England. At the age of twenty-two he was appointed captain-general of the Dutch forces, and, not long after, stadtholder. He was in the main responsible for the direction of the war against France, and as commander, though not always successful, he showed an indomitable spirit. Perhaps the most far-reaching event of his life was his marriage in 1677 to Mary, daughter of James, Duke of York, afterwards James II., King of England. When the English folk were estranged from James II., overtures were made to W. to invade England. These he accepted, and landed with a small force near Torquay on Nov. 5, 1688. On the flight of James II., the throne was offered to Mary, but William declared that unless he was made joint-monarch with his wife, he would withdraw to Holland. He was crowned with Mary in April 1689. In the following year he defeated James II. at the battle of the Boyne, and having conquered Ireland proceeded to subdue Scotland. He went to Holland in 1702 and commanded the Dutch army. He died from the effects of an accident while riding at Hampton Court. Shortly before his death he gave the royal assent to the Act of Settlement, which secured the throne ultimately to the House of Hanover.

William IV. (1735-1837), King of Great Britain and Ireland, was the third son of George III. and Charlotte Sophia, Princess of Mecklenburg-Strelitz. He went to sea in 1760, and in five years was promoted captain. He was created Duke of Clarence in

1789. Shortly after this dignity was conferred upon him, he contracted an intimacy with the pretty actress, Dorothea Jordan, with whom he lived for twenty years, and by whom he had several children, to whom the surname of Fitzclarence was given. In the interests of the royal succession he married in 1818 Adelaide, eldest daughter of George, Duke of Saxe-Coburg-Meiningen, but there was no issue of this alliance. He was appointed Lord High Admiral in 1827 and three years later, on the death of George IV., succeeded to the throne. He was a man of homely talents, boisterous, tactless, but good-hearted, but occasionally as king showing unexpectedly sound common-sense.

William I. (1772-1843), King of the Netherlands (1815-40), the son of William V., last stadtholder of the Dutch republic, born at the Hague. He fought in the war against France (1793-95), and on the defeat of Holland served in the Prussian and Austrian armies until 1813. At the Congress of Vienna Belgium was united with the Netherlands into one kingdom, and in 1815 W. was proclaimed king. Belgium shook off the yoke in 1832. In 1840 W. abdicated in favour of his son, adopted the title of Count of Nassau, and died in Berlin.

William I. (1797-1888), King of Prussia and Emperor of Germany. He was responsible for the absolutist and autocratic ideas which have pervaded the rule of the present imperial house of Germany. He found in Bismarck a minister anxious to govern according to his own view, and it may be said that between them they had a large part in the making of modern Germany. During the Franco-Prussian War W. commanded the Prussian army and led his soldiers to the victories of Gravelotte and Sedan. He was proclaimed Emperor of Germany in the Palace of Versailles on Jan. 18, 1871.

William II. (Friedrich Wilhelm Victor Albert) (b. 1859), German Emperor and King of Prussia, born at Berlin. He is the eldest son of the Crown Prince Frederick (afterwards Frederick III.) and of Victoria, Princess Royal of Great Britain, and the grandson of William I. He received a sound military training, and in 1885 had risen to the rank of colonel in the Hussars of the Guard. On the death of his father in 1888, he succeeded to the throne, and before long, by his indomitable will and determined autocracy, had a very powerful influence in Germany. Two years after his accession Bismarck, finding his own influence ebbing away, was obliged to resign. The Kaiser's chief ambition

has been to strengthen Germany's power in Europe by colonial expansion abroad. To this end he has reorganised the German army and navy, and has advocated a vast expenditure on the increase of armaments. This aggressive policy has been watched with many misgivings by other European powers, and particularly by England and France. W. has played a very prominent part in European politics, but has frequently caused offence both to his own subjects and to foreign nations by his unguarded utterances in public. He is a man of great versatility and exuberant energy, and is a keen sportsman, a poet, a painter, and a wide reader. In 1881 he married Princess Victoria of Schleswig-Holstein, and has had six sons and a daughter. See *The German Emperor's Speeches* (trans. by L. Elkind), 1904, and Noussanne's *William II.*, 1905.

William IX. (1071-1127), Duke of Aquitaine and Count of Poitou, and an early Provencal poet; succeeded to his hereditary estates in 1087. He went on a crusade in 1100 and reached Jerusalem, but was shipwrecked on his journey home. He was wild and gay and fond of warfare. Besides assisting the King of Aragon against the Moors and Louis the Fat against the Germans, he made inroads upon Toulouse and plundered Normandy. His songs are valuable to the student, being the earliest extant poems of the Romanesque school. See Maha's *Die Werke der Troubadours*, vol. i., 1846.

William and Mary College, Williamsburg, Virginia, U.S.A., an institution of higher learning, founded in 1693. It is a state institution, and in 1913 had 241 students with 20 instructors. The Phi Beta Kappa was founded here in 1776.

William of Champeaux (c. 1070-1121), a French philosopher, the founder of scholastic realism. He set up a school of logic in Paris, which was attended by Abelard (q.v.), his future rival. In 1113 he became Bishop of Châlons-sur-Marne.

William of Jumièges, see JUMIÈGES.

William of Malmesbury, see MALMESBURY, WILLIAM.

William of Newburgh (1136-c. 1198), an Early English historian, who wrote a *Historia Rerum Anglicarum* towards the end of the 12th century. His history begins in the year of the Conquest and extends to his own time. See edition of the Rolls Series (1884). William was a monk of the Augustinian priory at Newburgh, Yorkshire.

William of Orange, see WILLIAM III. OF ENGLAND; WILLIAM SILENT.

William of Tyre (c. 1137-84), arch-

bishop of Tyre and author of the mediæval history *Historia Rerum in Partibus Transmarinis Gestarum*. He was one of the principal ecclesiastical figures of the Latin Church in the E. in the middle ages.

William of Wykeham, see WYKEHAM, WILLIAM OF.

Williams, Edward (1746-1826), a Welsh bard, born at Penon, Glamorganshire, the son of a stonemason. He settled as a land surveyor at Flenington, Glamorgan. Under the bardic name of Iolo, he collected the Welsh MSS. published as *Myrvrian Archaeology*, 1801, and *Iolo MSS.*, 1848.

Williams, Sir George (1821-1905), the founder of the Young Men's Christian Association, born at Dulverton, Somersetshire. He went to London in 1841 and went into a drapery business, and becoming very successful was a personal factor of great good in an influential sphere during the Victorian era. He started the Young Men's Christian Association in 1844, and it was owing to him that Exeter Hall was secured for its headquarters. He was also interested in the Band of Hope Union.

Williams, Hugh William (1773-1829), a Scottish painter and writer. He lived chiefly at Edinburgh, but spent several years travelling in Europe, and in 1820 he published *Travels in Italy, Greece, and the Ionian Islands*, illustrated with engravings after his own sketches. Many of his best pictures are in the National Gallery of Scotland, while some others are in the Glasgow Municipal Museum.

Williams, Sir Monier Monier (1819-99), a Sanskrit scholar, born at Bombay. He laboured with distinction in bringing westward the wisdom of the Orient, and wrote *Religious Life and Thought in India*, 1883; *Indian Epic Poetry*, 1873; *Indian Wisdom*, 1875; and *Sanskrit Dictionary*, 1851-72. He also translated the *Sakuntala* and published works on Buddhism, Brahmanism, and Hinduism. Among other posts he held that of Boden professor of Sanskrit at Oxford in 1860, and was fellow of Balliol, 1882-88.

Williams, Roger (c. 1600-83), the founder of Rhode Is., U.S.A., born (probably) in London, though some authorities assert him to have been a Welshman, and was educated at the Charterhouse and Pembroke College, Cambridge. He joined the ... and in 1631 sailed ... in search of ... He preached at Plymouth (1635). ... ded the city of Providence where all true democrats

might live. Here, too, he established the Baptist Church. He was president of Rhode Is. from 1654-57, and published many works, including *The Bloody Tenent* (1644), and *The Hiring Ministry none of Christ's* (1652). See Club's edition of his works (6 vols., 1866-74), and *Lives by Knowles* (1833) and *Elton* (1852).

Williams, Rowland (1817-70), an Anglican divine and author of *Christianity and Hinduism* (1856). He was a Hebrew scholar of considerable distinction, and had an acquaintance with several oriental languages. As professor, he was connected with St. David's College in Wales and also with the University of Cambridge. He published beside the work mentioned *Lampeter Theology* (1856), and some poems and hymns.

Williams, Samuel Wells (1812-84), an American philologist, born at Utica, New York. He went to Canton, China, as printer to the American Mission in 1833, and acted as interpreter to Commodore Perry on his Japanese mission (1853-54). He was secretary of the United States legation at Peking (1862-76) when he returned to the U.S.A. and accepted the chair of Chinese at Yale. He was regarded as an authority on the Chinese and Japanese languages, and published, amongst other works: *A Syllabic Dictionary of the Chinese Language*, *The Middle Kingdom*, *The Topography of China*.

Williamsburg, the co. seat of James City Co., Virginia, 48 m. S.E. of Richmond; it contains the William and Mary College (1693), and East State Lunatic Asylum (1769), and manufs. lumber and woollen goods. Pop. (1910) 2714.

Williams College, Williamstown, Massachusetts, U.S.A., was founded in 1793 from a free school which owed its origin to Col. Ephraim Williams. It is well endowed and has a large number of scholarships. The library is good, and there are 22 college buildings. In 1913 the college had 558 students and 59 teachers.

Williamson, Peter (1730-99), a Scottish publisher and writer, born at Aboyno, Aberdeenshire. He had a most adventurous boyhood. At the age of about ten he was kidnapped and taken to America; he was sold to planters, captured by Indians, but managed to get away, and enlisted as a British soldier. On his return to Scotland, he started in business as a publisher and founded two journals called the *Scots Spy* (1776) and *New Scots Spy* (1777) and issued the first *Edinburgh Directory* in 1773.

Williamsport, the co. seat of Lycoming co., Pennsylvania, U.S.A., is a well-built and imposing town, stand-

ing in a pleasant country. It has manufactures of lumber, iron-goods, textiles, etc. Pop. (1910) 31,860.

William the Lion (1143-1214), succeeded his brother as King of Scotland in 1165. He was the grandson of David I. Henry II. of England refused to return Northumberland to Scotland, and so William made an alliance with France against England in 1168. In 1174 W. invaded England in alliance with Henry's own sons, was defeated at Alnwick, and sent as a prisoner to Falaise in Normandy. By the treaty of Falaise he was liberated, but he agreed to do homage to Henry for Scotland and all his other territories. He returned to Scotland in 1176, founded a monastery at Arbroath, 1178, and made the Church of Scotland independent of that of England. By the Treaty of Canterbury between him and Richard I. the independence of Scotland was recognised on payment of 10,000 marks.

William the Silent, Prince of Orange (1533-84), the founder of the Dutch republic, the eldest son of William, Count of Nassau, was born at Dillenburg in Nassau. In 1544 he succeeded a cousin to the principality of Orange and estates in Flanders and Holland, and before he was twenty-one Charles V. appointed him general-in-chief of the army and stadtholder of Holland, Utrecht, and Zeeland. In 1559 Henry II. of France, thinking him to be in the confidence of Philip II., told him of the Spanish plot to crush out Protestantism in the Netherlands. He did not betray his ignorance and his anger by word or look, and was henceforth known as 'the Silent.' In 1567 he placed himself at the head of the national rising against Spanish persecution, and openly embraced Protestantism. He was at first defeated by Alva, largely through want of means, but in 1579 he established the union of the seven northern provinces. He was assassinated by Balthazar Gerard, an agent of Philip II. See *Motley's Rise of the Dutch Republic*; *Cambridge Modern History*, vol. iii.; an *Lives* by F. Harrison (1897) and Ruth Putnam (1911).

Willibrord (or Willebrod), Saint (c. 657-738), an apostle of the Frisians, born in Northumbria, and brought up in a monastery at Ripon. After studying and preaching in Ireland (677-90), he sailed for Friesland (690) where he made many converts. Pope Sergius I. ordained him bishop, and about 695 he became archbishop of Utrecht.

Willimantic, a city, Windham co., Connecticut, U.S.A., 16 m. N.W. of Norwich, has manufs. of textiles,

paper, tin, and iron goods. Pop. (1910) 11,230.

Willington, an urban dist., Durham, England, on the Wear, 5 m. N. of Bishop Auckland; has collieries and stone-quarries. Pop. (1911) 8734.

Willington Quay, a tn. and par., Northumberland, England, on the Tyne, 2 m. S.W. of North Shields, has shipbuilding works, copper-smelting, lead, firebrick, and rope-making works. Pop. 7000.

Willis, Browne (1682-1760), an English antiquary, born at Blandford St. Mary. He was member for Buckingham from 1705-8. He left his MSS. to the Bodleian Library, and his collection of coins to Oxford University. He published *A Survey of the Cathedrals* (1727-30).

Willis, Nathaniel Parker (1806-67), an American writer, born at Portland, Maine. His first real success was obtained in 1831 with *Pencilings by the Way*, but five years later his *Inklings of Adventure* secured his reputation. The year before his *Melaine and other Poems* had been successfully produced in England, and he subsequently produced *Letters from Under a Bridge*; *Dashes at Life*; *Outdoors at Idlewild*, 1854; and *Paul Fane*, 1857. He was for a time foreign correspondent to the *New York Mirror*.

Willis's Rooms, see ALMACK'S.

Will-o'-the-Wisp, see IGNIS FATUUS.

Willoughby, a sub. of Sydney, from New South Wales, agricultural

interests. Pop. about 6000.

Willoughby, Sir Hugh (d. 1554), an English navigator and explorer. In 1553 he sailed from Deptford in command of an expedition to China, arranged by the merchants of London, and died with sixty-two men of scurvy off Lapland. His colleague, Richard Chancellor (q.v.), went on a different route and escaped his fate.

Willow, a name given to those members of the genus *Salix*, which are not osiers or salallows. They grow readily on damp soil and the Huntingdon or white W., grows rapidly to a height of 70 or 80 ft., and is a useful timber tree, as too is the Bedford or Russell's W. But the most valuable is the cricket bat W., a variety which originated in Norfolk and has been extensively planted.

Willow Moth (*Caradrina*), a genus of night moths. The caterpillar of *C. quadripunctata* often does damage to stored grain.

Willowmore, a tn., Cape prov., S. Africa, 185 m. by rail W.N.W. of Port Elizabeth, exports mohair, wool, and ostrich feathers. Pop. 5000.

Willow Wren, see WARBLERS.

Wills, William Gorman (1828-91),

an Irish playwright, born at Kilmurry. Having studied in the Royal Irish Academy he came to London and took up portrait painting, but ultimately turned his attention to literature. He wrote novels and plays and being considerably gifted with the dramatic instinct won some fame, especially with his plays. The chief are: *The Man o' Airlie*, 1866; *Charles I.*, 1872; *Eugene Aram*, 1873; *Maria Stuart*, 1874; *Sappho*, 1875; *Jane Shore*, 1876; *Olivia*; *Nell Gwynne*; *Sedgemoor*; and *Claudius*, 1885.

Wills, William John (1831-61), an Australian explorer, born at Totnes in Devonshire. He emigrated to Victoria in 1853, and became surveyor of the Crown lands (1855) and assistant at the magnetic observatory at Melbourne (1858). With O'Hara Burke (q.v.) he explored the interior (1860-61), but all the men but one of the expedition perished for lack of provision near Cooper's Creek. His journal of the expedition was edited by his father, under the title *Wills' Successful Exploration through the Interior of Australia*, 1863.

Wills and Testaments. The power of making a will or testament of personal property (see PERSONALTY; PERSONAL PROPERTY) has existed in England from very early times, but for centuries the common law and feudal archaisms operated to prohibit the disposition of land by will, and the power to make a will of lands was only acquired through the equitable doctrine of uses and trusts after much legislation, and considerable conflict between the courts of common law and equity (see LAND LAWS; USES). At common law a will might be nuncupative (see NUNCUPATIVE WILL), but at the present day the combined effect of the restrictions as to oral wills and testaments, and the requirements of the Wills Act, 1837, is to make it essential in practically every case to employ writing. Most wills, including codicils (q.v.), to be valid must be signed at the end of the will by the testator, or some other person in his presence, and by his direction, and such signature must be either made or acknowledged by the testator in the presence of at least two witnesses present at the same time, and such witnesses must attest the will in the presence of the testator. Any instrument executed in the above manner, may take effect as a will, provided the intention was that it should not operate till after the death of the donor; and again, a duly executed instrument, described as instructions for a will, may have effect as such, if it is apparent that it was intended to take effect in the

absence of a more formal instrument. Any alteration in a will, made after its execution, must itself be executed in the same way as a will, but an alteration is sufficiently executed if the testator and the witnesses sign their names in the margin, or in some place opposite, or close to, the alteration: or sign a memorandum at the end of the will referring to the alteration. Alterations not duly executed can, however, be validated by a codicil, confirming the will (*see also EVIDENCE*). A will is in all cases revocable, even though the testator may expressly declare it to be irrevocable. Every will is now construed with reference to the estate, real or personal, comprised in it, to 'speak from death' or, in other words, to take effect as if it had been executed immediately before the death of the testator, unless a contrary intention appears by the will; which last words, however, only relate to the question of *what* property passes by the instrument, and do not mean that whatever the testator says in his will is to be interpreted as if the will were made on the day of his death. As regards personal property there is no restriction as to what a person may bequeath by his will, whether his interest in such property be one that is then actually vested, or only contingent or executory; and a person may validly dispose of property acquired subsequently to the making of his will. As regards land it is to be noted that the restrictions on testamentary disposition are only such as arise from the limitations of the particular subject-matter (*see ESTATE; LIMITATION; LAND LAWS; and SETTLEMENT*); there is nothing to prevent a person from devising land to which he is absolutely entitled in fee simple; but of course if he have no more than a freehold interest for his own life he will have nothing to dispose of at his death in default of some power of appointment vested in him (*see POWER*). Every person of sane mind, except an infant (*q.v.*), can make a valid will; and every person of age can be an attesting witness, including a creditor, or an executor: but where the will purports to make a gift to the spouse of an attesting witness the attestation is good, but the gift void. A will is revoked by a subsequent will or codicil; or by a writing declaratory of an intention to revoke and duly executed like a will; or by destruction, burning, tearing, cancellation, etc., provided there was an intention to revoke by such destruction, etc., or by marriage of the testator, subsequent to the date of the will (this does not apply to wills made in exer-

cise of a power of appointment). The only way to revive a revoked will is to re-execute it, or to make a codicil showing an intention to revive it. By Lord Kingsdown's Act no will or testament shall be held to be revoked or to have become invalid, nor shall its construction be in any way altered by reason of any subsequent change of domicile (*q.v.*) of the person making the same. Where a beneficiary under a will predeceases the testator, the gift lapses except in certain cases (*see LAPSE*). A bequest or devise to two or more persons by name, or by a general description of them as a class (*e.g.* 'the nephews of X') is construed as a joint gift (*see also JOINT TENANCY*), and where any of the joint donees predecease the testator, their shares go to the surviving joint donees. On the other hand the donees will take 'in common' (*see COMMON TENANCY*) if the testator has used words implying separate interests (*e.g.* 'equally,' or 'among'). But a gift to a class, even though as tenants in common, *e.g.* a bequest of '£10,000 to the children of X in equal shares' will be construed as a gift to such of the children of X as shall be living at the death of the testator, and the predecease of any one of them does not cause a lapse.

A person, as noted above, must be of sound mind if his will is to be valid; this means that he must have an 'understanding of the nature of the business in which he is engaged, recollection of the property he means to dispose of, of the persons who have a claim to be the objects of his bounty, and the manner in which it is to be distributed'; and where he is subject to delusions with regard to persons who would be the natural objects of his bounty, his will, while he is under the influence of such delusions, is invalid. Delusions, however, that leave the general power of understanding unaffected and which are in no way connected with the testator's testamentary dispositions, will not affect his capacity to make a will (*Theobald on Wills*). (*See also UNDUE INFLUENCE*.) In Scotland the law as to wills and testaments is very similar in effect. Prior to 1868 the most clearly expressed will not only was ineffectual to dispose of land, but was not even held to impose any obligation on the heir (*see INHERITANCE*) to implement (*q.v.*). Since 1868 any one not under any specific disability can settle his heritable (*q.v.*) and movable property upon whom he pleases, excluding his legal successor, by a testament or will, or by any instrument which may properly be called a will. The term 'will' is not a technical one in Scots law, and

means merely 'any written declaration of what a person wills to be done with his movable estate after his death.' It, therefore, embraces all forms of deeds granted in anticipation of death, besides testaments. The term 'testament' is the proper technical term for what in English law is called a will. Formerly it was not competent to any one to dispose of his land by testament, but since the Act of 1868 above noticed, that restriction has ceased to exist, with the result that the terms will and testament are virtually synonymous. The Wills Act, 1837, does not apply to Scotland, but so far as form is concerned, there is no great difference between a Scottish and an English will, except that a holograph will requires no attestation, though every other kind of will does (see HOLOGRAPH). See also EXECUTORS; PROBATE.

Will's Coffee House, a famous convivial resort in Russell Street, London, originally called 'The Red Cow,' then 'The Rose.' Dryden first made it famous among the wits of the period, and after his death it was frequented by Pope. These 18th-century coffee houses gave rise to the modern clubs. See *Timbs's Club Life in London*.

Wilmerding, a tn., Allegheny co., Pennsylvania, U.S.A., 13 m. E. of Plttsburg. Pop. (1910) 6133.

Wilmington: 1. A co. seat of New Castle co., Delaware, U.S.A., on the Delaware R., 27 m. S.W. of Philadelphia. Among its notable buildings are the Old Swedes' Church (1698), Ferris Industrial School, and Friends' School. Its manufs. include paper, machinery, railway carriages, and leather. There are large shipbuilding yards. See *Powell's Historic Towns of the Middle States*, 1899. Pop. (1910) 87,411. 2. A co. seat of New Hanover co., N. Carolina, U.S.A., on the Cape Fear R., 20 m. from the sea. It has cotton-seed oil mills, naval stores, dye works, lumber mills, etc. Pop. (1910) 25,748.

Wilmot, David (1814-68), an American legislator, born at Bethany in Pennsylvania. He began to practise as a barrister at Wilkesbarre in 1834, and represented Pennsylvania as a Democratic member in (1845-51). He was the author of *Wilmot's Proviso* to an act for the purchase of territory by which he opposed the introduction of slavery into the new territory. He sat in the Senate (1861-63), and was appointed judge in the Court of Claims (1863-68).

Wilmot, John, see ROCHESTER, EARL OF.

Wilmot, John, see ROCHESTER, JOHN, second EARL OF.

Wilmslow, a small tn. in Cheshire, England, on the Bollin, 5½ m. S.S.W. of Stockport. Pop. (1911) 5153.

Wilna, see VILNA.

Wilsden, a small tn. in the W. Riding of Yorkshire, England, 4 m. S.E. of Keighley. Worsteds manufactured here. Pop. (1911) 2958.

Wilson, a co. seat of Wilson co., N. Carolina, U.S.A., with manufs. of tobacco, cotton, wagons, oil, etc. Pop. (1910) 6717.

Wilson, Andrew (1831-81), a traveller, born at Bouibay. He was editor of the *China Mail*, and the *Bombay Gazette*, and also contributed to *Blackwood's Magazine*, but he is best known for *The Abode of Snow* (1875), an account of his travels in China and Tibet, and *The Ever Victorious Army* (1868) which sets forth Gordon's Chinese campaigns.

Wilson, Sir Daniel (1816-92), an archaeologist, poet, and scholar, born at Edinburgh. He went to London in 1837, but subsequently returned to Edinburgh and published *Memorials of Edinburgh in the Olden Time*, 1847, and *Archæology and Prehistoric Annals of Scotland*, 1851. After this he went to Canada and became professor of history and English literature at Toronto University, 1853, ultimately being elected president, 1881. He also published *Caliban, the Missing Link; The New Atlantis; The Right-Hand Left-Handedness; Anthropology*.

Wilson, Henry (1812-73), vice-president of the U.S.A., born at Farmington, New Hampshire. He was for a time a shoemaker, but in 1840 was elected to the Massachusetts legislature and state senate, entering the U.S. Senate in 1855. He was chairman of the important committee on military affairs during the Civil War, and in 1873 became vice-president with Grant. His chief work was *History of the Rise and Fall of the Slave Power in America*, 1872-75; but he also wrote *Anti-Slavery Measures in Congress*, 1861; and *Military Measures in Congress*, 1868.

Wilson, Horace Hayman (1786-1860), an English orientalist, born in London. He was appointed assistant to the East India Company and while in Bengal made a study of Sanskrit. He became professor of studies at the Hindu College, Benares (1819), Boden professor of Sanskrit at Oxford (1832), librarian to the East India Company (1836), and director of the Royal Asiatic Society (1837-60). He published a *Sanskrit-English Dictionary* (1819), a *History of British India*, 1805-35 (1846), and translated *The Rig-Veda Samhita* (1850-57), etc.

Wilson, John (1785-1854), who wrote under the pseudonym of 'Christopher North,' was educated at Oxford, where he won the Newdigate Prize in 1806. He settled at Elleray on Windermere, and led the life of a country gentleman, but losing his fortune in 1815, owing to a dishonest trustee, he was in that year called to the bar. The law, however, made no appeal to him, and it was to literature that he turned to provide him with a living. Already in 1812 he had published a volume of poetry, *The Isle of Palms*, and in 1816 he issued *The City of the Plague and other Poems*. With the establishment of *Blackwood's Magazine* in 1817 W. came into prominence. He was one of the original staff and a regular contributor. In 1820 W., for no other reason than that he was a Tory, was elected to the chair of moral philosophy at Edinburgh University. In *Blackwood's* appeared his *Lights and Shadows of Scottish Life* (1822), *The Trials of Margaret Lindsay* (1823), *The Foresters* (1825); but it is as the author of the *Necles Ambrosianæ* that he is best remembered, and in those papers he displayed to the full his admirable literary gifts. His works were collected in 1855-58 by his son-in-law, Professor Ferrier; and there is a biography by his daughter, Mrs. Gordon (1862).

Wilson, John Mackay (1804-35), an English writer, born at Berwick-on-Tweed. He became editor of the *Berwick Advertiser* (1832), published *Tales of the Borders* (1834-35), and gave popular lectures.

Wilson, Richard (1714-82), an English painter. A native of Penegoes, Montgomeryshire, he studied art in London and afterwards in Italy. He was among the original members of the Royal Academy, founded in 1768, while subsequently he was appointed librarian to that body; yet his pictures were but little in demand during his lifetime, and it was not till many years after his death that he became recognised as one of the greatest English masters of landscape-painting. There are numerous works from his brush in the National Gallery, while there are several in the Glasgow Municipal Museum, and others in the National Gallery of Scotland.

Wilson, Thomas (c. 1525-81), a secretary of state and critic, born in Lincolnshire. He was educated at

where he came of the revival of the study of Greek, led by Cheke, Sir Thomas Smith, and others. His first important work was *The Rule of Reason* (1551), and this was followed by *The Arte of Rhetorique* (1553), 'the first criticism in our language.' From

1555-60 he was on the continent, and on his return was admitted advocate in the court of arches. He was M.P. for Michael Borough (1563-67) and for Lincoln (1572-81), and in 1578 was made a privy councillor and secretary of state. He was also employed on various diplomatic missions, especially to the Netherlands. He published, besides the works above mentioned, *The Three Orationes of Demosthenes* (1570), the earliest English translation from Demosthenes.

Wilson, Thomas Woodrow (b. 1856), president of the U.S.A., born at Staunton, Va. He received his early education in the South, at home in Georgia, and graduated at Princeton University (1879). He took the graduate course in history at John Hopkins University, and was appointed professor of jurisprudence at Princeton (1890), and made president of Princeton (1902). After a successful career he became governor of New Jersey (1911). Stood for nomination for presidency of U.S.A. on Democrat ticket in 1912, and was elected by an overwhelming majority. He married in 1885 Miss Helen Louise Axson, and has three daughters. He is the third Democrat president of the U.S.A., and is an effective politician. He pledged himself to and carried through the revision of the tariff laws, and promised a campaign against the trusts. Two of the first acts of his government in foreign affairs were the recognition of the Chinese Republic and the refusal to recognise the Huerta government in Mexico.

Wilson Steamship Line was founded in 1835 by Mr. Thomas Wilson of Hull. Its steamships run between Hull and the ports of Northern Europe, the Mediterranean, and the Black Sea, and also visit New York, Boston, and Bombay. In 1910 its vessels numbered 87, and their gross tonnage was 190,278 tons.

Wilton, a market tn. and municipal bor., Wiltshire, England, 3 m. W.N.W. of Salisbury; has been celebrated for its carpets since the time of Elizabeth. It was the seat of a bishopric until 1075, and was the capital of Wessex. Wilton House, seat of the Earls of Pembroke, has mementoes of Sir Philip Sidney, Holbein, Vandyck, Ben Jonson, and Inigo Jones. W. gave its name to the county. Pop. (1911) 8079.

Wiltshire, a S.W. co. of England, bounded N. by Gloucestershire, S. by Dorsetshire, E. by Berkshire, and W. by Somersetshire. The surface is for the most part hilly, and includes Salisbury Plain (20 m. by 16 m.) in the S., some 400 ft. above sea-level, with the North Downs forming its northern border, and to the N.E. the

Marlborough Downs and Savernake Forest. The principal rivers are the Kennet, the Lower or Bristol Avon, and the Salisbury Avon. There are also the Thames and Severn Canal, the Wilts and Berks Canal, and the Kennet and Avon Canal. Nearly the whole county is under cultivation; oats is the main crop; large numbers of sheep are reared, and a considerable area is under permanent pasture. Dairy-farming flourishes, and there are condensed milk manufactories. At Swindon there are locomotive works belonging to the Great Western Railway; at Devizes large engineering works: cloth and carpets are also manufactured at Trowbridge, Wilton, etc. There are iron mines near Westbury and Bath, and Portland stone is quarried. Salisbury (q.v.) (17,117) is the county town. The county returns five members to parliament. W. is famous for its antiquarian relics, especially the Druidical remains at Stonehenge and Avebury, while the camp of Vespasian near Amesbury is equally interesting. Wans Dyke is a relic of the Romans, and there are numerous ecclesiastical ruins of later periods, including the abbey of Malmesbury, Lacock, and Edington. The Saxon church of St. Lawrence at Bradford-on-Avon is also notable. Salisbury cathedral is a fine example of the Early English, and the parish churches are many of them of great interest. There are castle ruins at Old Sarum, Marlborough, and Devizes, and Wardour Castle, dating from the 18th century, has a fine collection of curios, including the famous 'Glastonbury Cup.' A number of fine old mansions are dotted about the county. The area is 864,101 acres. Pop. 286,822. See *Victoria County History: Wiltshire*.

Wimbledon, a tn. in Surrey, England, 8 m. S.W. of St. Paul's, London. The annual meetings of the National Rifle Association were formerly held on Wimbledon Common (1860-89). It has interesting remains of early British earthwork. Pop. (1911) 54,876.

Wimborne Minster, a market tn., Dorsetshire, England, 6 m. N. of Poole; is an agricultural centre. The minster, dating from the Conquest, has a 14th-century lunar orrery. Pop. (1911) 3711.

Winchcomb, a market tn., Gloucestershire, England, 7 m. N.E. of Cheltenham, has flour-mills, paper works, and tanneries. Queen Catherine Parr was buried here. Pop. 9647.

Winchelsea, a market tu. and Cinque Port, Sussex, England, 2 m. S.W. of Rye, Old Winchelsea, an important seaport in Saxon times, was destroyed by the sea about 1288. Pop. (1911) 101.

Winchendon, a tn., Worcester co., Massachusetts, U.S.A., 36 m. N. of W. of Worcester. Manufs. cotton goods, machinery, and furniture. Pop. 5800.

Winchester, a cathedral city and municipal and parl. bor. of Hampshire, England, on the Itchen, 12 m. N.E. of Southampton. The Saxon kings of Wessex are said to have been crowned in the old cathedral, of which no traces remain. The present cathedral was erected by Bishop Walkelin in the 11th century. Additions were made by William of Wykeham and others, so that the styles of architecture vary from Norman to Perpendicular. It is the longest cathedral (557 ft.) in England, with a nave of 351 ft. It contains the tombs of Cardinal Beaufort, Isaac Walton, and Jane Austin, and a shrine to St. Swithun. Not far from the cathedral lie the ruins of Wolvesey Castle, and to the N. those of Hyde Abbey in which King Alfred was buried. The county court is held in the hall of a mediæval castle on Castle Hill, which contains the famous relic known as 'Arthur's Round Table.' The College of St. Mary, better known as Winchester College, was founded by William of Wykeham in 1381. Consult works by Dean Kitchin (*Historical Towns Series*, 1891), *Leicester* (1889); Leach, *History of Winchester College*, 1899; and *Winchester, its History, Buildings, and People* (ed. by P. and G. Wells). 2. A tn. Middlesex co., Massachusetts, U.S.A., 8 m. N.W. of Boston. It has a Hosp. for Aged People, State Aviary, Swan Park (known as 'Middlesex Fells') and manufs. of felt and machinery. Pop. (1910) 9309. 3. A tn. of Fairfield co., Connecticut. Pop. (1910) 8679. 4. The cap. of Frederick co., Virginia, with manufs. of paper, paper, gloves, etc. It contains the Valley Female College, and Felt Hall. Pop. (1910) 5864. 5. A seat of Clark co., Kentucky, with manufs. of gasoline engines, etc. It contains the Kentucky Wesleyan College. Pop. (1910) 7156.

Winckelmann, Johann Joachim (1717-68), a German art critic, born at Stendal in Prussia, the son of a shoemaker. Educated at Halle and Jena, he began life as a private tutor, and in 1748 became librarian to Count von Bülow at Dresden. There he was converted to Roman Catholicism by the pope's nuncio, at whose suggestion he settled in Rome. He made friends with the leading Italian painters and was librarian first to Count Archinti (1755), and then to Cardinal Albani (1759), finally becoming antiquary of the apostolic library.

ber (1763). He was murdered at Trieste by an Italian to whom he had shown some gold coins. W. was a great exponent of classic art, and is regarded as the founder of scientific archaeology. His chief works are *Geschichte der Kunst des Alterthums* (1764) and *Monumenti Antichi Inediti* (1767-68). See Goethe, *Winckelmann und sein Jahrhundert*, 1805; and *Life* by Justi (1866-73).

Wind. The Ws. or lateral movements of the earth's atmosphere are determined by the distribution of pressure within that fluid, movement taking place from high to low pressure indirectly. The theory of Ws. as worked out by Ferrel and others discusses primarily *planetary Ws.*, those which would occur on a homogeneous planetary body on account of its relation to the sun and the distribution of radiation received. For the earth the results are supposed to be zones of calm—at the equator due to ascending air currents, near Cancer and Capricorn, and at the poles due to descending currents. The intervening belts on either side of the equator have thus equator-seeking Ws.; on the polar sides of the tropical calms, pole-seeking Ws. Theory is, however, far from perfect, and the distribution and direction of Ws. at different levels in the atmosphere is extremely uncertain. Poleward Ws. are deflected to the E., equator-seeking winds to the W., by the influence of the earth's rotation. The atmosphere partakes of the earth's motion of rotation, and a W. has in its earliest course a component velocity corresponding to its latitude. On reaching different latitudes this becomes a defect or excess of that of the earth's surface it now passes over, and the W. 'lags' or 'leads'; the resultant course is thus curved. The trade Ws. blowing into equatorial low pressure are N.E. and S.E., curving more and more westwards. The Ws. blowing polewards from the tropical calms are N.W. or S.W., and curve more and more eastwards. In the S. hemisphere they are well developed as the Roaring Forties. The planetary Ws. swing N. and S. with the sun, but over much less latitude. *Terrestrial winds.*—The earth's surface is not a uniform level, and the water level rises and falls, and the air pressure varies oppositely to temperature, a definite disturbance of planetary Ws. is caused. The tendency is for Ws. to blow into the continents in summer and out from them in winter. This is only established over Eurasia to any general extent, but it is markedly so on the S. and E. of Asia, where the

trade Ws. are reversed in summer and blow landwards, the trades of the S. Indian Ocean obliterating the doldrums and joining the S.W. monsoon, as the reversed Ws. are called. These *periodic Ws.* form a separate class to the *prevailing Ws.*, which are constant throughout the year. Marked deflection of planetary Ws. is also noted in Australia, S. Africa, and S. America, where the S.E. trades are drawn more westwards during summer on to the E. coasts. They are also drawn over Nigeria from the Gulf of Guinea. In N. America the plateau of Mexico and the arid and high regions of Western U.S.A. similarly draw the N.E. trades eastwards. This effect is added to by the opposition of coast lines, particularly if mountainous, to the passage of surface Ws., with the result that round areas of tropical high-pressures in each ocean the Ws. tend to form vast anticyclonic systems, clockwise in the N., anticlockwise in the S. hemispheres. In the N. oceans beyond these systems huge cyclonic systems form. It is these systems, which are strongly modified planetary Ws., that form the real W. systems of the world. Towards the equator they are steady and gentle, but towards the pole, until the Arctic regions are reached, they are disturbed by constant eddying, due to mingling of surface and upper currents, the westerlies being characterised by a constant succession of such cyclonic storms. *Local winds.*—Of chief importance are those induced by mountain masses, which change or intensify prevailing Ws. Elevated masses of land, above the clouds and humid atmosphere, respond more readily to the sun's influence, and suffer extremes of temperature day and night, summer and winter. In day-time and during summer they heat the air and cause up-draughts, and *vice versa* at night and during winter; with other complications this helps to form Föhn and Chimook Ws., the bora, northers, etc. Land and sea breezes are caused in warm calm regions by the different reactions to the sun's rays. Violent storms such as tornadoes and typhoons are largely developed on the margin of the equatorial calms. Ws. of the *upper atmosphere* are very little known; it seems probable that there is a general drift of cold air, poleward and eastward, above the trades. The *force* of W. is measured by the anemometer (*q.v.*); it is expressed in lbs.-pressure per sq. in. The Beaufort scale, arranged in 1805 by Sir F. Beaufort, was based on the amount of sail a ship could safely carry; in its modern form it may be given:

Miles
per hr.

0	Calm	.	.	3	} Moving leaves.
1	Light air	.	.	8	
2	Light breeze	.	.	13	} Moving branches.
3	Gentle	"	.	18	
4	Moderate	"	.	23	} Swaying branches : blowing up dust.
5	Fresh	"	.	28	
6	Strong	"	.	34	} Swaying trees : blowing up twigs.
7	Moderate gale	.	.	40	
8	Fresh	"	.	48	} Breaking branches : damaging boardings and signs, or deficient brickwork.
9	Strong	"	.	56	
10	Whole	"	.	65	} Destroying buildings not thoroughly substantial.
11	Storm	.	.	75	
12	Hurricane	.	.	90	

For local Ws. see separate titles. See Bnehan, *Report on Atmospheric Circulation*, 1889; Ferrel, *A Popular Treatise on the Winds*, 1893; Bartholomew and Herbertson, *Atlas of Meteorology*, 1899; Pomortzell, *The Law of the Distribution of the Velocity of Winds*, 1894; and *The Beaufort Scale of Wind Force*, 1906.

Windau, a seaport of Courland, Russia, at the mouth of the R. Windan, which here forms a small harbour. It has important fisheries and exports timber. Pop. 7150.

Windermere: 1. The largest lake in England (11 m. by 1 m. broad), on the boundary of Westmorland and Lancashire. Its shores are much indented and wooded, growing steeper towards the N. It drains into Morecambe Bay through the Leven. 2. A tn. of Westmorland, England, 7 m. W.N.W. of Kendal. Pop. 5117.

Windflower, see ANEMONE.

Windgalls, in horses, swellings occurring at the fetlocks and due to an accumulation of fluid about the joints. They are usually caused by hard work, and may disappear on the horse being rested for some time. They appear to give no pain.

Windham, William (1750-1810), a statesman, as a young man became the friend of Johnson and Burke. In 1783 he became chief secretary to the Lord-Lieutenant of Ireland, but only held office for a short time, and in the following year entered parliament. Under Pitt he was, from 1794-1801, Secretary for War with a seat in the Cabinet, and in 1800 was in the Grenville administration.

Windham, William, a brilliant and loyal, but his changes of opinion earned him the nickname of 'Weathercock W.' He assisted Cobbett in 1802 to found the *Political Register*, and was for some years on intimate terms with him. His speeches were published by Amyott in 1806. A selection from his diary was edited by Mrs. Henry Baring in 1866. *The Windham Papers*, a collection of his correspondence, ap-

peared in 1913, with an introduction by Lord Rosebery.

Windhoek, a settlement, cap. of German S.W. Africa. It has hot thermal springs, and is connected by railway with Swakopmund on the coast, and with Keetmanshoop (a distance of 380 m.).

Wind Instruments are of three classes: (1) keyboard, e.g. organ, concertina, etc., played by bellows; (2) wood-wind, e.g. clarinet, flute, oboe, bassoon, and other reed instruments, played by mouthpiece; and (3) brass, e.g. horn, trumpet, trombone, and other instruments with cup-shaped mouthpieces.

Windlass, a machine used for lifting weights through a considerable distance, as in raising water from a well. It is a modification of the wheel and axle (q.v.), and consists of a cylindrical roller made to rotate upon its axis by a crank and handle. The weight is attached to a long rope which is coiled round the roller as the handle is turned.

Windmills were in use in England as long as 600 years ago, but are believed to have been introduced as long ago as a thousand years. There were two forms of the old-fashioned type, the German and the Dutch. In the former the whole mill was supported on a post round which it could be turned for the sails to catch the wind; in the latter a more substantial fixed body was erected of wood, brick, or stone, only the upper part revolving. Turning was performed by hand in both cases, by means of cog-wheels working on a rack fixed round the support. In the Dutch type, where the movable mass had much less weight, an automatic device was applied, consisting of an auxiliary vane or 'fan-tail.' The wind acts on four or more sails pivoted on an axle with their faces slightly inclined to the plane of the sails, as in the screw propeller or ventilating fan. If these are held facing the wind its force is resolved into a strain and a component

vertical to the inclined faces which rotate them on the axle. The rotation of this was transmitted by means of bevelled cog-wheels to a shaft driving the mill wheels. The 'fan-tail,' placed on a long arm on the opposite side of the mill, by virtue of its leverage, kept in the direction of the wind, thus keeping the sails at right angles to that direction. In modern American W. a similar tail serves the same purpose. By supplying a vaned wheel instead of a tail, its rotary motion was transmitted to the mechanism for adjusting the angle of the sails, so that they always faced the direction of a varying wind. The sails are inclined backwards from their pivoting, and the plane of revolution is also inclined to clear the lower part of the tower; they are 20 to 40 ft. in length. When of canvas on a frame, arrangement was usually made for reefing in order to adjust speed to the velocity of the wind. In many cases slats or flaps of thin wood were used and the angle of these could be adjusted. Such W. have become almost obsolete, at any rate not being replaced as they become dilapidated, owing to the introduction of steam engines, and later gas and oil motors. On the other hand, the modern American light and efficient type, an outcome of the genuine improvement in engineering materials, knowledge, and method, has been largely adopted for working water-pumps, to supply farms and houses with their own water. The sails of these are of steel and arranged more numerous and closely to a wheel, as in the ventilating fan; the strips are thin, narrow, and concave towards the wind. The apparatus is provided with a tail, the whole being balanced on a pivot at the top of a light tower of girder steel work. The axle is inclined slightly or horizontal in different patterns. Ball thrust or roller bearings with arrangements for lubricating are used, and a band-brake worked automatically by the tail in its movement regulates the speed. An arrangement is provided for starting or stopping the movement from the base of the tower. The motion of the axle may be transmitted direct or through gearing and a separate crank axle to the long piston rod of the pump. The axle is set to one side, while the tail axis passes through the centre; by this means the power of the tail is increased, and in gusty or rough weather the wheel is thrown 'out of the wind,' and the speed thus steadied. Some American W. are rudderless, the wind-wheel being placed on the lee side of the tower. In many, a centrifugal governor is

used; others have solid instead of sectional wheels, and are governed by a side vane; but the patterns are very numerous. Power increases at a slightly greater rate than the square of the wind velocity. A 12 ft. mill should furnish 1 h.p. in a 20 m., 1.4 h.p. in a 25 m. wind. A 25 ft. mill should raise one-third of an acre-foot of water to a height of 25 ft. in a working day of eight hours. The economy is reckoned as 1.5 that of a steam-pump, expenditure being less in repairs, and none for fuel and practically none for attendance; there is no supply of water needed. On the other hand, uncertainty of wind demands large storage arrangements. See J. A. Griffiths, *Windmills for Raising Water*, Proc. Inst. C. E., vol. cxix. No. 2672, 1895; E. C. Murphy, *The Windmill, its Efficiency and Economic Use*, Water Supply Papers, U. S. Geol. Survey, 1901; A. R. Wolff, *The Windmill as a Prime Mover*, 1890.

Window, an opening in the wall of a building for the admission of light and air, but not for purposes of ingress and egress. As an architectural feature windows play a very small part in the ancient architectures of Egypt, Greece, and Rome. In the Gothic and later styles, however, they are exceedingly important features for every class of buildings. In the Gothic especially they are so characteristic by their general forms and proportions, as well as their decoration and details, as to be in that style equivalent to what the orders are in the temple architecture of antiquity. In architectural design, it is quite contrary to the fundamental principles of the art to leave window and similar openings as mere naked gaps in the wall, and hence they require 'dressings,' or borders, to give an air of finish and completeness. Doors and windows are, therefore, the first features in a building. One of the characteristics of the Gothic style in windows derive strong architectural expression from the apertures themselves, the very mullions, transoms, and tracery forming an exquisite design and decoration. See ARCHITECTURE.

Windpipe, see TRACHEA.

Wind River Mountains, a lofty range of mountains in W. Wyoming, U.S.A. It belongs to the Rocky Mountain system, and its highest point is Fremont's Peak, about 13,570 ft.

Windsor: 1. A municipal bor. of Berkshire, England, on the Thames, 21½ m. from London. It contains a town hall built by Sir Christopher Wren in 1686, the church of St. John

the Baptist, with fine examples of Grinling Gibbon's wood-carving, and a fine Jubilee statue of Queen Victoria; but it owes its importance to the castle, which is one of the principal royal residences. The tn. was formerly famous for its inns, one of which, the Garter, is frequently mentioned by Shakespeare. Pop. 15,370. 2. A city and port of entry of Essex co., Ontario, Canada, on the Detroit R. The chief manufactures are the Canadian Salt Company, paint and varnish works, flour mills, canning factories, and boiler and machine shops. It is the centre of an agricultural and fruit-growing district, and during the navigation season has a large trade in the Great Lakes. Pop. 17,829. 3. A seaport tn. of Canada, cap. of Hants co., Nova Scotia. It has a considerable export trade in the gypsum and limestone of the region. Its chief institution is King's College or Windsor University, founded in 1788. Pop. 3625.

Windsor Castle, one of the best-known among the royal and palatial edifices of Europe, is in a manner to England what Versailles is to France and the Escorial to Spain. But while it is infinitely superior to both in point of situation, it far exceeds them and indeed every other pile of building of its class in antiquity. In its present state, however, this antiquity is little more than nominal. The first structure on the site was that of the Conqueror, but the plan did not begin to assume its present state and arrangement until the 14th century, when extensive building operations were carried on under the surveillance of William of Wykeham. Under Elizabeth the terraces were formed and the castle was thus given one of its most striking and attractive characteristics. Under the Stuarts nothing material was done until the Restoration, when the castle began to be modernised in a tasteless and in-lipid manner. Charles II. added the Star Building. George III., among other alterations, renovated the interior of St. George's Chapel, but the main work of improvement was left to his successor, under whom extensive alterations were carried out under the direction of Sir J. Wyatt.

Windt, Harry de, *see* DE WINDT, HARRY.

Windthorst, Ludwig (1812-91), a German politician, born near Osnabrück. He was president of the Catholic consistorium, and a judge of the supreme court of appeal in Hanover (1848), and three years later was elected President of the Hanoverian second chamber. He was a distin-

guished politician, and after the annexation of Hanover by Prussia he came leader of the ultramontanes in the German parliament against Bismarck.

Windward Islands, a group of the W. Indian Is., including Barbados, St. Lucia, St. Vincent, the Grenadines, Grenada, and Tobago. Of these, Barbados is a separate colony with its own governor, and Tobago is attached to Trinidad. Hence the government of the W. I. is made up of the three colonies of Grenada (the seat of government), St. Vincent, and St. Lucia, with their dependencies, the Grenadines being divided between Grenada and St. Vincent.

Wine, the name given to the fermented juice of the grape. The term is also employed to designate alcoholic beverages obtained from the fermentation of the juice expressed from apples, elderberries, rhubarb, etc. The making of W. was well known to the ancients, especially to the Romans. The juice, or 'must' as it is called, expressed from the grape is a viscous liquid consisting of water holding sugars and various organic and inorganic acids and salts in solution. On exposure to the heat of the sun the must spontaneously ferments. In a few days the fermentation reaches a maximum and the liquid is well stirred and then allowed to stand for about a month. The liquid is then clear and a precipitate has formed at the bottom of the vat. The W. is removed to other vessels and left for a period of several months to complete the after fermentation. At the end of this time all the sugars in the juice have been converted into alcohol and carbon dioxide. The precipitate from the W. is called argol, and consists chiefly of potassium hydrogen tartrate, containing impurities such as calcium and magnesium tartrates. The precipitate is formed on account of the decreasing solubility of these substances in the liquid as it becomes more alcoholic. During fermentation, red Ws. tend to become lighter in colour and less astringent, due to the separation of tannin and colouring matters. The 'fining' or 'clearing' of Ws. is carried out by the addition of albumin, isinglass, gum, lime, gypsum, etc. The addition of gypsum (plastering) causes the removal of potassium bitartrate, leaving the acid sulphate of potassium which gives a dryness to the W. and increases its durability. Ws. which contain much sugar are often 'sulphurised' by addition of sulphur dioxide, to prevent undue fermentation. The aroma, or 'bouquet' of a W. depends on the particular ethers

present in the liquid. It has been shown that the bouquet passes with the ferment from one W. to another. Thus, if a ferment is transferred, the W. fermented by such ferment has the bouquet of the W. from whence the ferment was taken. The vinous odour is due to the presence of cœnantlic ether. The amount of alcohol in a W. is determined by the percentage of sugar in the 'must,' one part of alcohol being produced by the fermentation of about two parts of sugar. As a rule the percentage of alcohol does not exceed 12 to 15 per cent., and such Ws. are termed natural Ws. Extraneous sugar is often added ('doctoring') to increase the percentage of alcohol, and such Ws. are then termed fortified Ws. The name 'dry' Ws. is given to Ws. in which the fermentation of the sugars is complete. If fermentation is checked before it is completed, a fruity W. is the result, while sparkling or effervescent Ws. are the result of bottling before fermentation has ceased. The qualities of a good W. are much improved by 'maturing' for several years. The experiments of Pastour, however, have shown that by heating the W. to about 140° F. for a short time it is preserved from deterioration, and also takes on the properties of matured W. The colours of particular Ws. may be due to the addition of various colouring matters. Red Ws. owe their colour to the fact that the skins of the grape are left in the vats during the first fermentation. Light Ws., such as Burgundy, claret, hoek, etc., contain from about 8 to 13 per cent. of alcohol, while champagne contains about 15 per cent. and port and sherry often as much as 24 per cent. For the various types of Ws. see CHAMPAGNE, CANARY, BORDEAUX, BURGUNDY, HOCK, MADEIRA, PORT, SACK, SHERRY, etc.

Winfield, a city and co.-seat of Cowley co., Kansas, U.S.A., on the Walnut R. It has flour-mills, grain elevators, machine shops, and stock-yards, and there are limestone quarries in the vicinity. Pop. (1910) 6700.

Winfried, the real name of St. Boniface (q.v.).

Wings, see BIRD, FLYING.

Winifred, St., the patron saint of virgins, probably a native of Wales. She was beheaded by Prince Caradoc for refusing to submit to his attempted seductions.

Winkelried, Arnold von, a Swiss patriot, who is said to have decided the victory of his compatriots over the Austrians at Sempach in 1386. The enemy formed a dense mass of steel which the Swiss could not penetrate. Seeing this W. grasped a number of the Austrian pikes and buried

them in his breast, thus creating a gap in the ranks through which the Swiss rushed over his body.

Winnibago, Lake, the largest lake in Wisconsin, U.S.A. It is connected by Fox R. and Green Bay with the Great Lakes, and has an area of 212 sq. m. Its clear waters are abundantly supplied with fish, and its well-wooded shores, with pretty towns intervening, make it most attractive.

Winnipeg, the cap. of the prov. of Manitoba, Canada, ranks third among the cities of Canada. It is situated at the confluence of the Red and Assiniboine rivers, and is the seat of a university. It is one of the chief banking and financial centres of the Dominion, and is also a great manufacturing centre. Pop. about 200,000.

Winnipeg, Lake, is in the prov. of Manitoba, Canada. It has a length of some 250 m., and is from 5 to 70 m. broad. Its chief tributaries are the Saskatchewan and the Red R., but it also receives the surplus waters of Lakes Winnipegosis and Manitoba, besides the Winnipeg R. The surplus water is discharged by the Nelson R. into Hudson Bay.

Winnipegosis, Lake, a shallow lake in North-Western Manitoba, extending into Saskatchewan. It has a length of 127 m., and receives the Red Deer and Swan rivers, while it discharges into Lake Manitoba to the S.E. through the Water Hen R.

Winona, a city and co. seat of Winona co., Minnesota, U.S.A., on the Mississippi R. The chief manufacturing establishments are flour and lumber mills, waggon and carriage factories, agricultural implement works, railroad shops, breweries, and patent medicine works. Pop. (1910) 18,583.

Winsey, or Wincey, a cloth consisting of wool mixed with cotton. It may be plain or twilled, and usually has a cotton warp and woollen filling.

Winsford, an urban dist. of Cheshire, England, on the Weaver, which produces salt. Pop. 10,770.

Winslow, Edward (1595-1655), one of the 'pilgrims' who sailed for America in the *Mayflower*. He came of an old English family. W. took an active part in the life and organisation of the Plymouth colony in New England and returned to England on one or two occasions as agent for the settlers. He was made governor of the colony in 1624 and was several times re-elected.

Winsor, Justin (1831-97), an American historian, born at Boston. After studying at Harvard and Heidelberg, he was appointed librarian at Boston in 1868, holding this post until 1877,

when he removed to Harvard. He edited the *Memorial History of Boston* (4 vols.), 1880-81, and *The Narrative and Critical History of America* (8 vols.), 1884-90, and wrote: *Christopher Columbus*, 1891; *The Mississippi Basin*, 1895; *The Westward Movement*, 1897; *Reader's Handbook of the American Revolution*, 1879.

Winstanley, Henry (1644-1703), an engineer and engraver, the eldest son of Henry W. (d. 1680) of Saffron Walden. He was clerk of the works to Charles II. at Audley End and Newmarket in 1666, and in 1696 furnished a design for Eddystone Lighthouse. In 1697, while superintending its construction, he was carried off by a French privateer and the work destroyed. On his release, however, he completed the building, but lost his life in a storm, which swept away the entire structure. He published engravings of Audley End (1676).

Winston, a city, co. seat of Forsyth co., N. Carolina, U.S.A. It is the commercial centre of a fertile agricultural region, especially noted for its tobacco, indeed, the growth of W. is chiefly due to this industry, and the manu. of flat plug tobacco here is especially important. Pop. (1910) 17,167.

Wint, Peter de (1784-1849), an English landscape painter of Dutch origin, and a 'little master' of the old English school. He studied at the Royal Academy. De W. is best known for his water colours, which have all the purity and freshness of the best work of this school.

Winter commences, astronomically, when the sun has attained his lowest declination, i.e., his lowest noon position in the sky. This occurs for the N. hemisphere when the sun enters Capricorn; for the S. when he enters Cancer, that is when he is in the zenith on those tropics. The sun's rays falling then at the least angle with the horizon, temperature falls, to rise again towards spring when the sun passes his mean noon position. Climatically W. is very varied, corresponding with a dry season usually, but in 'Mediterranean' regions with a wet season. Biologically it is the annual period of suspended animation for many forms of life.

Winter's Bark, the bark of *Drimys winteri*, an evergreen tree (order Magnoliaceae). W. B. resembles cinnamon, and is used as a tonic and in cases of scurvy.

Winterthur, a tn. of Swtze . . . the canton of Zurich, with . . . of cotton goods, including . . . and machinery. A good wine is produced in the neighbourhood. Pop. 25,000.

Winthrop Family: John (1588-1649), governor of the colony of Massachusetts (1629-34 and 1637-19), born in Suffolk, England. He sailed from Yarmouth with 900 persons in 1630, and on the voyage composed an essay, *A Model of Christian Charity*. During his life he had more influence probably than any in forming the political institutions of the northern states of America. John (1606-76), governor of Connecticut, son of the preceding. In 1635 went to Connecticut, built a fort at the mouth of the Connecticut R., was made governor of the colony, and founded the city of New London in 1661. He obtained a charter for the colony from Charles II., and was first appointed governor under it; and, in 1676, represented his colony in the congress of the united colonies at Boston. John, LL.D. (1715-79), an American scholar born in Massachusetts; in 1738 was appointed Hollis professor of mathematics and natural philosophy at Harvard. He published tracts on earthquakes, comets, and other astronomical subjects. Robert Charles, LL.D. (1809-94), an American statesman and orator, born at Boston; graduated at Harvard College in 1828, studied law with Daniel Webster, was admitted to the bar in 1831, and was elected to the state legislature in 1831, where he served five years, three as Speaker of the House. In 1840, he was elected to Congress, of which he was a member for ten years. His *Addresses and Speeches* were published in 1852.

Winthur, Rasmus Villads Christian Ferdinand (1796-1876), a Danish lyrical poet, born in Zealand. He began by writing for periodicals, but in 1828 brought out his first volume of poems, which contained the charming set of descriptive verses entitled *Woodcuts*. It was followed by seven or eight volumes of lyrics, and by an epical romance, *The Stag's Flight*. W. also published works in prose, e.g. *In the Year of Grace*, a novel (1871), but his fame rests upon his songs and lyrics which place him in the first rank of Danish poets.

Wintour, John Crawford (1825-82), a Scottish landscape painter. He lived chiefly in Edinburgh, but went often to the Highlands or the Borders in quest of subjects for his art, and, though his best work was done in oils, he was a prolific water-colourist also. There is a fine picture from his brush in the Glasgow Municipal

Rolls from which drawn are generally rolled to about No. 8 gauge, say 0.16 inch, the further reductions being performed through dies by means of

being dried the rod is mechanically drawn through dies by being wound on to drums. Modern wire-drawing employs a series of dies, the number being fixed by the amount of reduction the wire will stand before requiring annealing. But it is not possible, without overstraining the finished wire, to pull from the end through all the dies at once, consequently an arrangement of power-driven drums must be supplied between each set of dies, round which the wire is lapped two or three times. Again, each succeeding drum revolves at a higher speed than preceding one, in order to take up elongation in the wire. Owing to the hardening effect due to continuous cold drawing of steel wire, the amount of reduction is strictly limited, due to the wear on the dies, consequently the process is much more successful when the wire is made of copper or brass. In order to reduce the wire to very small gauges, it must be annealed after so many passes—usually two to six, varying with the amount of reduction—so as to re-soften the material. The dies used for ordinary gauges are made of hard white cast iron, and for high carbon

finest sizes are either diamonds or rubies. Piano-wire of 0.0254 in. diameter may have a tensile strength of over 200 tons per sq. in. The carbon content may vary from dead mild, say, less than 0.1 per cent. C. in telegraph wire, up to 0.9 per cent. C. for the best hard wire.

Wireless Telegraphy may be defined as an electrical method of signalling from place to place without the use of wires. From the scientific point of view it really dates from the introduction of Clerk Maxwell's paper before the Royal Society in 1864 on *A Dynamical Theory of the Electro-magnetic Field*. Electrical means of signalling between stations without the use of wires had been utilised before this time, but they were of very limited application. Signalling by sounds and flashes of light are very old methods, and may be said to fulfil the definition of signalling without wires. In the case of sound, the transmitter consists of some vibrating object which sets the air in its vicinity in vibration. These vibrations in the air travel outwards with a velocity of 1100 ft. per second, and are detected by the ear at the receiving station. A simple illustration of the propagation of these sound waves through the air may be seen in the dropping of a stone into an ex-

panse of still water. Small concentric waves or ripples in the water are seen to diverge outwards, the concentric rings formed becoming larger and larger as they recede from the centre of the disturbance. Sound waves in the air are analogous to these ripples in some respects. In the case of signalling by flashes of light, the transmitter causes these flashes and so sets the ether in vibration, the vibration travelling through the ether with a velocity of 186,000 m. per second. These vibrations are detected at the receiving station by the eye generally or by some mechanical

The transmitter in . . . arranges the flashes . . . generally accepted . . . ally the Morse Code.

The ether is the medium by which the electrical waves used in wireless telegraphy are transmitted through space. This medium is supposed to be universal, existing throughout all space and permeating all matter. Scientists cannot conceive of any action at a distance, that is to say, without some intervening medium. It is a well-known scientific fact that the atmosphere does not exist beyond about 200 m., and yet we receive light and heat from the heavenly bodies. Some medium is necessary to transmit these effects, and thus the ether is assumed to be the medium. Very little is known of the properties of this ether, but it is accepted that it can transmit vibrations with very little if any loss of energy. It may be compared to an extremely attenuated jelly. Now if any elastic medium is disturbed by a vibration, this disturbance is propagated throughout the medium, the velocity of propagation depending on the properties of the medium. In sound the medium is air, in light and electrical signalling the medium is this universal ether. Thus we see the essential apparatus for signalling by the means of waves is (1) a transmitting agent to set the medium in vibration; (2) a suitable receiver to detect the vibrations at the receiving station. The waves set up in the medium may be represented graphically as in Fig. 1. The

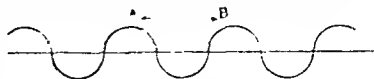


FIG. 1

frequency of the waves is the number of complete vibrations per second made by the transmitting agent, the wave length is the distance AB, i.e., the distance from the crest of a wave to the next crest. If V represents the velocity of the waves through the

medium, N = the frequency, and L = wave length, then $V = NL$, but it should be remarked that V is independent of the frequency. It has been stated that both light waves and electric waves are transmitted by the ether, hence they have the same velocity, their difference existing only in their frequency. The eye is affected by a limited number of waves, the frequency of these waves, which are called light waves, being between the limits 3.73×10^{14} and 8.33×10^{14} vibrations per second. The waves which oscillate more slowly are the heat waves by which heat is propagated through space, and those which oscillate still more slowly are the waves utilised in wireless telegraphy. The production of these waves is quite a recent event, being predicted by Clerk Maxwell and confirmed experimentally by Hertz in 1888. Hertz's experiment consisted of producing electric waves by the oscillatory discharge of a condenser. He employed two square plates connected by wires to two small spherical knobs. These plates constitute the condenser. The condenser was charged by an induction coil. When the potential difference between the knobs reaches a certain value it breaks down the air insulation between the knobs and an alternating discharge takes place. Now it is a well-known fact that when a current passes through a wire there is an accompanying magnetic field, and if the current is reversed the magnetic field reverses its polarity. This oscillatory discharge between the knobs is analogous to a

series of small impulses having the same period than by a series of much larger impulses of varying periods. It has been noticed that if a piano is played, when a certain note is struck some ornament gives out a sound, i.e., it resounds to the note. This is an example of resonance of tuning. Hertz employed this method, his receiver consisting of a wire circle having on its ends two small knobs very close together. This is tuned to the transmitter. When the oscillations take place by the discharge of the condenser, a series of sparks will be seen to pass between the knobs in the ring, although held some distance away. In this way Hertz confirmed the fact that electric waves travel through space with the velocity of light. It may be pointed out that the discharge of the condenser is not continuous, but after each discharge there is an interval before the next, time being required to charge the condenser up to the potential difference necessary to break down the insulation between the spark knobs. Each discharge gives rise to a group of waves called a *wave train*. Thus, after several discharges there are several *wave trains*, each separated from the other. If a bell be struck it will be noticed that the sound gradually dies away; this is

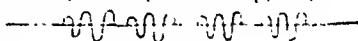


FIG. 2

due to the *damping* of the sound waves. This phenomenon of *damping* also occurs in electric waves, and the waves can only be kept up continuously by giving energy to the system continually. Now in the discharge of the condenser the energy gradually decreases, and thus waves of the form in Fig. 2 are set up, which shows four wave trains affected by *damping*.

outwards in all
locity of light.
the method of
resonance or *tuning*, a most important method in wireless telegraphy. To illustrate it simply, consider a large expanse of water. If a cork is dropped into it, ripples are seen to diverge in all directions in the form of concentric rings, while the cork executes a series of up and down motions. If another cork be placed on the other side of the expanse of water, the ripples or waves reach it eventually and give to it an up and down motion similar to the first cork. Thus by means of the intervening waves the second cork is made to copy the motions of the first cork. This is a rough explanation of what takes place. To state the principle of resonance precisely, it may be said that any mechanical system which can vibrate with a definite period will be much more greatly affected by a

Transmitting apparatus.—The first apparatus, called the *plain aerial*, was a modification of Hertz's condenser arrangement. It consisted of the two balls, one connected to the earth which formed one plate of the condenser, the other plate being a long wire stretching upwards into the atmosphere (Fig. 3). This long wire, which forms the other plate of the condenser, is called the *aerial* or *antenna*. Both plates are connected to an induction coil which charges the plates, resulting in a discharge across the air gap. When this takes place the aerial discharges its energy and an oscillating current flows from the aerial to the earth and back again. These oscillations soon cease in about a few hundred-thousandths of a

second. The air gap resumes its normal condition and the aerial is then ready to receive the next charge from the coil. The process is then repeated and every time the aerial is discharged a *wave train* is sent out from it. An induction coil,

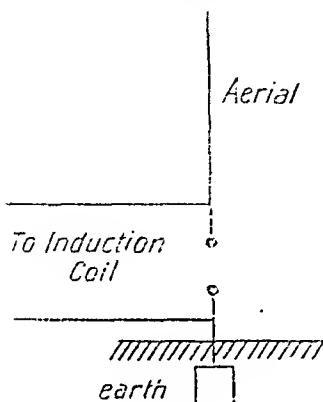


FIG. 3

if left to itself, would have charged the aerial at a continuous rate, and thus the receiving station would receive a series of continuous effects. This would be useless for signalling purposes, it being necessary to regulate the periods between the wave trains or discharges to divide them up into the 'longs' and 'shorts' of the Morse Code. This was effectively done by regulating the supply of the current to the induction coil by means of a switch. This simple apparatus has several disadvantages in that its range is limited and it was found impossible to make the system selective, due to

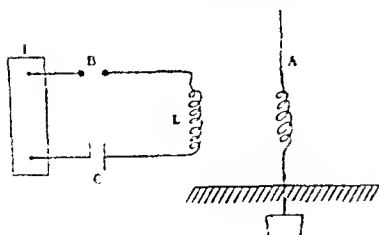


FIG. 4

the large amount of *damping* in the waves. This was soon displaced by the 'coupled system.' In this we have two separate oscillatory circuits tuned to the same frequency. The aerial in Fig. 4 is marked A, the

lower end being earthed. C is a condenser which is charged by the induction coil L. the spark balls being at B. The energy passes from the coil L into the aerial by means of the transformer composed of the two coils shown. The transformer is often called the *jigger*. It is most important that the air-wire be *tuned* to the other system. With this arrangement a much longer series of oscillations could be produced in the aerial for a single charging up of the condenser. In large power stations where the distance to be travelled is much longer, a greater supply of energy is needed, hence in this case an *alternator* is substituted instead of the induction coils. Fig. 5 gives a dia-

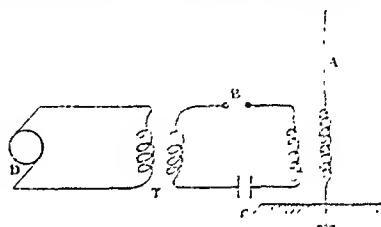


FIG. 5

gram for a large sending station, the letters denoting the same parts as in Fig. 4, but in addition we have the alternator D and another transformer or jigger T. To ensure that the sparks shall pass at regular intervals a device known as the Mareoni rotary spark gap has been introduced.

Receiving instruments.—An aerial is fixed at the receiving station, the aerial being tuned to that of the transmitting station. This is necessary in order that the receiving aerial may pick up the wave trains. The instrument for detecting the presence of the waves is called a *coherer*. The earliest form consisted of a glass tube containing iron filings, the tube being fitted with iron plugs at both ends. In the presence of electric waves the filings tend to cling together, and thus the resistance to a current through the coherer is less in the presence of electric waves than in their absence. Hence, if a battery is attached, the current which will flow when the filings cohere together may be sufficient to ring a bell, say, whereas when the filings do not cohere the battery would not be able to send a current strong enough to do so. The only disadvantage to this form of coherer is the fact that the filings remain clinging together after the waves which caused them to do so have ceased, and thus renders the

coherer incapable of detecting further groups of waves. This difficulty is surmounted by a tapping arrangement which taps the coherer and so decoheres the filings. The coherer of this type, which is used at the present time, consists of a glass tube exhausted of air and plugged by two silver plugs, the filings consisting of a mixture of silver and nickel. Fig. 6



FIG. 6

represents a modern type of coherer, S and S representing the silver plugs, the filings, represented by dots, being placed in the space between them. A simple form of receiver is given in Fig. 7. A represents the aerial, C the condenser, Co the coherer, and T a transformer; the coherer circuit being tuned to that of the aerial. A far more reliable and sensitive detector is Mareconi's magnetic detector, which consists of a band of soft iron moving continuously under

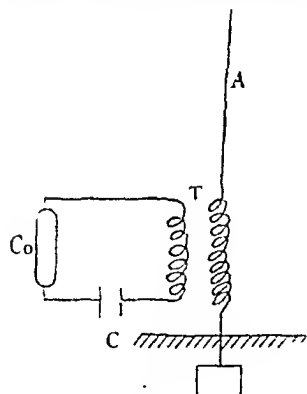


FIG. 7

the poles of a pair of horse-shoe magnets. Just above the magnets the wire is made to pass through two small coils, the outer of which is connected to a telephone receiver and the inner to the aerial, so that oscillating currents pass through it. Every wave train then causes a 'click' in the telephone. These clicks combine to form a sound which is interrupted in the same way as the wave train, and thus the 'longs' and 'shorts' of the Morse Code are easily detected. Several other forms of detectors are in use, such as the crystal detector, etc. The perception of the direction

from which the waves are being received is an important point. Marconi showed that if the sending aerial is bent so that there is first a vertical portion and then the remainder parallel to the ground, then the waves radiate most strongly in the direction away from which the wire is bent. Fig. 8 shows an aerial bent in this

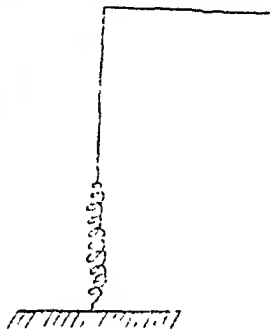


FIG. 8

manner. Similarly the receiving aerial messages come in most strongly when the wire points away from the sender, hence the best condition for the communication between two stations is that the aerials point as in Fig. 9, S being the sending station and R the receiving station. For secrecy of communication, the method of tuning is employed, and as the wave length can be varied, so the aerials can be tuned to some secret wave length, it being remembered that an aerial will

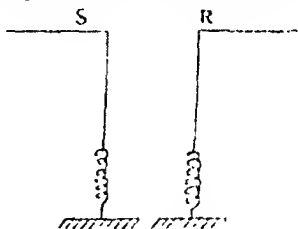


FIG. 9

only pick up those wave lengths to which it is tuned. Various systems besides the Marconi are in operation at the present time. Marconi laid the foundations for all the practical workings of W. T., the other systems sharply involving other methods in

The latest
was estab-
the Gold-

schmidt system. Messages were transmitted in daylight between Hanover in Germany and Tuckerton, Atlantic City, in the U.S.A., a distance of about 4000 m. The system differs essentially from the Marconi system in the method of generating the energy and its reception at a distant station. A high frequency alternator is employed, which allows the energy to radiate from the aerial in the form of undamped waves. The receiver consists of a tone wheel which gives the signal as a clear musical tone. This system appears to be a great improvement on the Marconi system.

The following books may be consulted: Fleming, *The Principles of Electric Wave Telegraphy and Telephony*; Erskine Murray, *Handbook of Wireless Telegraphy*; Collins, *Manual of Wireless Telegraphy*; Fleming, *Elementary Manual of Radio-Telegraphy and Radio-Telephony*; J. A. Fleming, *The Wonders of Wireless Telegraphy*.

Wireless Telephony. This implies the transmission of sound through space without the use of connecting wires. A brief explanation as to the nature of sound is necessary to a satisfactory understanding of wireless telephony. Sound consists of trains of vibrations in the air. These vibrations are caused by some vibrating object, e.g. a violin string, the vocal chords in speaking, etc. When they fall on the drum of the ear they give rise to the sensation of sound. In telephony of any kind the function of the transmitter is to utilise these vibrations and to produce changes in an electric current, the changes of current causing the sounds to be reproduced in the distant receiver. How this is realised is explained under TELEPHONY. It is in the transmission of sounds of different quality or timbre that the difficulties of telephony commence. Timbre, e.g. the difference between the sounds emitted by a violin and a flute, depends on the smoothness of the variations of pressure in the air vibrations. In telephony the changes in the current must correspond to these changes of air pressure in every detail. If this does not take place, the quality of the sound transmitted will be lacking and will become more or less inarticulate. In wireless telephony as now practised the process is practically the same as in wire telephony. The first wireless telephone invented by Bell was the *photophone* (q.v.). This employed a flickering beam of light, the flickering being controlled by the speaker's voice. This had several disadvantages, and so did not attain very much commercial importance. The introduction of wireless

telegraphy by Marconi gave a new impetus to the development of the subject. Several inventions were taken out based on the Marconi telegraph system; but most of the early ones failed because of the very low frequency of the discharge. Sound waves have a very high frequency, e.g. 2500 waves per second, and it was found impossible to transmit these waves by about one hundred electric impulses per second. Attention was therefore turned to the production of electric impulses at a much greater frequency. It has been pointed out that one method employed in the production of alternating currents of high frequency is by utilising a high frequency alternator (see DYNAMO) as done by Fessenden. Another method introduced by Duddell and used in several systems, e.g. Poulsen system, is the 'arc' system. Fig. 1 represents the Duddell 'arc' system.

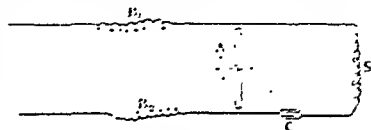


FIG. 1

A represents the arc lamp supplied by the current coming in by the wire B₁ and leaving by B₂. The arc lamp produces oscillations in the circuit ACS. B₁, B₂ are two choking coils to choke any return current, C a condenser to prevent any current from the arc supply entering into the secondary coil S, the frequency of the alternating current in the circuit ACS being controlled by the dimensions of C and the inductance of the circuit. The above are the two chief methods of producing the alternating current required; the 'arc' system being used to the greatest extent. By suitably cooling one of the electrodes and enclosing the lamp in an envelope of gas, e.g. ordinary lighting gas, it is estimated that about five hundred oscillations are made per second.

Transmitting apparatus.—The apparatus for converting sound waves into electric waves consists in the primary stages of the ordinary wire telephone transmitter, i.e. the microphone (see MICROPHONE, and TELEPHONY). Reference may here be made to the microphone invented by Professor Majorana, which differs essentially from Hughes's microphone. This microphone has been used by Majorana in his wireless telephony experiments, the results obtained showing its efficiency. It consists of a fine jet of conducting liquid which

falls between the platinum plates. These plates are fixed in the transmitting circuit, the nozzle of the jet being fixed to a membrane on which the sound waves fall. The sound vibrations cause the jet to vary in thickness and thus alters the resistance of the film of liquid between the plates, which results in a variation of the current passing from one plate to the other. In order to transmit sounds it is necessary to adopt a method of varying the average

varying current is superimposed on the alternating current in the circuit CAS₁.

ing the
mer S₂.

then sent out as in wireless telegraphy. Another method is to employ the microphone to vary the strength of the alternating current itself. Pessenden employed this method by connecting one terminal of the high frequency alternator to the earth and the other terminal to the microphone. The microphone is then connected directly to the aerial, thus effecting a control of the radiation according to the sound waves incident on it.

Receiving instruments.—The method of receiving the electro-magnetic waves depends, as in wireless telegraphy, on the principle of resonance. As in telegraphy, several stations can be worked simultaneously in the same vicinity without interfering with one another, and by suitably altering the rate of alternation of the transmitting current any station can be put into communication with any other. Yet it would be impossible to locate a large number of stations such as would be required in a populous district, and thus there is little likelihood of the wire system being displaced. In the receiving station a detector of electro-magnetic waves is required. These take various forms, the simplest type being the crystal detector. It consists of a sharp point of some hard crystal, e.g. carborundum, which presses against the surface of some metal. The waves falling on this detector heat the fine point, and thus if a circuit is made containing the detector, a direct current is generated. This follows from the well-known

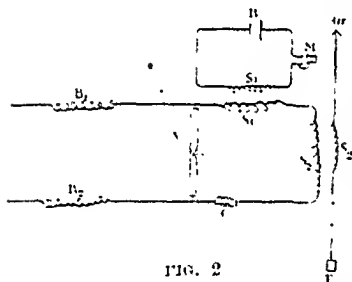


FIG. 2

in this connection. The alternating current is set up by the Duddell 'arc' system which has been explained previously. B₁ and B₂ are choking coils, A the arc, and C the condenser, the

The microphone M, the primary coil S₁, which has the same number of turns as the secondary coil S₂ in the circuit CAS₁, the two coils forming together a transformer, and the battery B. Another transformer, S₂, consists of two coils, one placed in the circuit CAS₁, and the other in the aerial or antenna. One end of the antenna is fixed in the earth as at E, the other being a free end in the air. By speaking into the microphone a varying current corresponding to the incident sound waves on the microphone is set up in its circuit; this

in telephony is the electrolytic detector. Usually it consists of a very fine platinum wire, one end of which projects from the end of a glass tube. The point is immersed in an acid solution, the platinum and the solution being connected to the receiving circuits. Several other detectors have been introduced more or less suitable for the reproduction of speech. The earliest method for sending out the waves and receiving them was to employ a long horizontal wire, supported on posts and earth-connected at both ends; being connected at one end to a microphone and a battery. At the receiving station a similar wire was placed parallel to the transmitting wire, connected to the ground through a telephone receiver. Sound was transmitted by this means, but the method is very limited in its scope. Modern telephony utilizes only

ono earth connection, the other end being elevated above the ground. The best type of aerial or antenna, as this elevated wire is termed, is fan-shaped. Its advantages consist of a small inductance, large capacity, and a very low resistance, which are of immense importance in the radiation of energy in the case of alternating currents. See Ernest Rulmer, *Wireless Telephony*; Erskine Murray, *Wireless Telephones*; C. R. Gibson, *Wireless Telegraphy, and Telephony without Wires*. See also TELEPHONY, and WIRELESS TELEGRAPHY.

Wiring, Electric, see ELECTRIC LIGHTING AND WIRING OF HOUSES.

Wirksworth, a market tn., Derbyshire, England, 14 m. N.N.W. of Derby; has lead mines, stone quarries, and manufactures of tape, hosiery, silk, and hats. St. Mary's Church dates from the 13th century. Pop. (1911) 3888.

Wisbech, a municipal bor., market tn., and river port, Cambridgeshire, England, on the R. Nen, 21 m. E.N.E. of Peterborough, in the centre of an agricultural and fruit-growing district; has manufactures of agricultural implements, beer, and oil-cake. Pop. (1911) 10,828.

Wisby (Visby), a seaport of Sweden, cap. of Gotland län, on the W. coast of Wisby Is. in the Baltic. St. Mary's Cathedral was founded about 1190-1225, and is still used. St. Nicholas is nearly as old, but in ruins. W. was an important member of the Hanseatic League, and gave its name to a maritime code of the 13th century. Its ruined turreted walls date from the 13th century. It is a bishop's seat and a favourite resort. Sugar, chalk, and cement are among its exports. Pop. about 8380.

Wischau, a tn., Moravia, Austria, on the Hauna, 19 m. E. by N. of Brünn. Pop. (1911) 6220.

Wisconsin: 1. (Often called the Badger State.) One of the north-central states of the U.S.A., and is twenty-first in size of the republic. It is bounded on the N. by Michigan and Lake Superior, E. by Lake Michigan, S. by Illinois, W. by Minnesota and Iowa. The greatest length is 300 m., the greatest width 250 m., and the total area about 56,040 sq. m. It is watered by numerous rivers, notably the Mississippi, St. Croix, Menomonee, Montreal, St. Louis, and the Wisconsin. The principal sheet of water is Lake Winnebago, which is 30 m. long, and around the Kettle Moraine are clustered hundreds of small lakes. The forest growth is dense save in the S., which is prairie-land. Iron and copper ore are found in the N.W., while lead occurs in the S.W. The climate generally is temperate, but is

subject to extremes, and in winter is very severe. The air is dry and tornadoes are of frequent occurrence. Agriculture is the greatest industry, and the chief crops are Indian corn, hay, and wheat. Tobacco of excellent quality is grown successfully, and beet-sugar factories flourish. The fisheries are important. Milwaukee is a large port and a great manufacturing centre. The system of education is especially good, and the state university has attained quite

sportation is
rays feed the
was hindered
by continual wars with Indians, and the first white man to enter the state was Jean Nicolet, who came there in 1634. During the Civil War W. supplied some of the best regiments in the Northern army. The growth of the population is steady, and in 1910 it was about 2,334,000. 2. The chief riv. of the Interior of Wisconsin, U.S.A., rising in Lake Desert on the Michigan boundary, and flowing S. and S.W. past Portage City to join the Mississippi near Prairie du Chien. A canal connects it with Fox River and Lake Michigan. Length about 600 m., navigable to Portage. There are rapids and falls in parts.

Wisdom, Book of, see ECCLESIASTICUS, PROVERBS, SOLOMON.

Wiseman, Richard (c. 1622-76), an English surgeon. Joining the Royalist forces (1643), he was taken prisoner at Worcester (1651). W. became surgeon to Charles II. on the Restoration. He was one of the first really great surgeons, and helped to raise his profession to a position of honour. See *Asclepiad*, iii. 231 (1886); Longmore, *Bioq. Study*... (1891).

Wishart, George (c. 1513-46), a Scottish Protestant martyr and reformer, a member of the Wishart family of Pittarrow, Forfarshire. He was early accused of heresy, at Montrose (1538) and Bristol (1539), and then travelled abroad in Switzerland and Germany. He was at Corpus Christi College, Cambridge (c. 1542-43), and returned to Scotland (1543), preaching Lutheran doctrines on a tour through the Lothians. He found ardent supporters at Dundee, Montrose, and elsewhere, his most famous disciple being John Knox. Through the enmity of Cardinal Beaton, W. was arrested at Ormiston (1545) and burnt at St. Andrews on a charge of heresy (1546). The cardinal was assassinated soon afterwards, partly in revenge for this. W.'s translation of *The Confession of Faith of the Churches of Switzerland* (1548) was printed in the *Wodrow Miscellany*, i. (1846). See Laing's ed. of Knox's Works, i. and vi.; Foxe, *Book of*

Martyrs: Fleming, *Martyrs of St. Andrews*; Rogers, *Life*, 1876; Cramond, *Truth about George Wishart*, 1898; Maxwell, *Old Dundee*, 1891.

Wishart, George (1599-1671), a Scottish divine, studied at Edinburgh and St. Andrews. Having refused to take the Covenant he was deposed from his charge at St. Andrews by the General Assembly (1639), and accompanied Archbishop Spottiswoode to England. W. then settled at Newcastle, but was several times imprisoned. He was chaplain to Montrose (1645), was with him at Philiphaugh battle, and fled with him to the Continent. W. became Bishop of Edinburgh (c. 1662). His known works include a Latin account of Montrose's campaigns (1647; English trans., 1756, 1819), and MS. sermons delivered at Newcastle, 1644.

Wishaw, a tn. of Lanarkshire, Scotland, 5 m. from Carlisle. There are iron coal-mines, blast furnaces, iron, engineering, and railway wagon works. Pop. about 20,870 (with Cambusnethan and Craigmiles).

Wismar, a port of Mecklenburg. The head of the river R. dates from a 15th cen. It is famous for its machinery, and manufactures of asphalt, sugar, tobacco, paper, and sail-cloth are manufactured. It has iron foundries, breweries, and important fisheries. W. belonged to Sweden (1648-1803). Pop. about 22,000. See Willgeroth, *Gesch. der Stadt Wismar*, part I., 1898.

Wissembourg, see WEISSENBURG.

Wissmann, Hermann von (1853-1905), a German African explorer. He accompanied Dr. Pogge to Africa (1880-82), and went on alone to Zanzibar. For the Belgian government he later explored the Congo region, revisiting Lubuku, founding Luaburg and Lucho, and then taking boat down Kassai R. (1883-85). W. reached the E. coast by way of Tanganyika and Nyassa (1887), but failed in his attempt to take steamers by this route to Lake Victoria (1892). As Imperial Commissioner he crashed an Arab rising in German E. Africa (1888-91), becoming governor (1895-96). His works include: *Im Innern Afrikas*, 1888; *Meine Züge durchquerung Äquatorial-afrikas*, 1891 (Wolf's new ed. 1907); *In den Wildnissen Afrikas und Asiens, Jagdergebnisse*, 1901. See Hermann von Wissmann, by Rulke, 1892; Perbandt, Richelmann, and Schmidt, 1906.

Witch, see MAGIC, DEMONOLOGY, INCANTATION, DIVINATION.

Witenagemot (Saxon *witan*, to know, and *gemoth*, assembly), in

Anglo-Saxon times the great national council or parliament, consisting of members of the royal family, the archbishops, bishops, abbats, ealdormen, and king's thanes. In practice its members varied from a score to a hundred, but in theory the W. having been evolved by absorption of the lesser Ws. or folkmoets of the tribes comprising the Heptarchy, it is probable that all freemen were entitled to attend. The meetings were generally held biennially and at different places. The *de jure* powers of the W. were unlimited, and it could elect the king or dethrone him for misgovernment, declare war or make treaties of peace, levy taxes, appoint and remove all the great officers of state, control most ecclesiastical matters, and deal as a Court of Final Appeal.

After the Great Council, the *Curia Regis*, though still as great as before in theory, began to devolve for the most part on a committee called the *Curia Regis*, the evolution of which body will be found described under COUNCIL.

Witham: 1. A tn. of Maldon div., Essex, England, 9 m. from Chelmsford, on Brau R. There are ancient earthworks round the church of St. Nicholas. Pop. about 3460. 2. A riv. rising in Rutlandshire, England. It flows past Grantham and Lincoln, and then S.E. past Tallershall and Boston into the Wash above Welland R.

Withernsea, a watering-place of the E. Riding of Yorkshire, England, on the North Sea, 15 m. from Hull. Pop. about 1430 (with Hillym).

Withnell, a par. of Chorley div., Lancashire, England, 5 m. from Blackburn. Pop. about 3360.

Witkowitz, a tn. of Mährisch-Ostrau dist., N.E. Moravia, Austria-Hungary, 23 m. from Ratibor, with important coal and iron industries. Pop. about 19,130.

Witness, see EVIDENCE, OATH.

Witney, a market tn. of Oxfordshire, England, on the Windrush, 10 m. from Oxford. It is noted for blanket making (though the term W. blanket is loosely applied to any raised blanket with a border wherever made), and also manufs. gloves and other woollen goods. Among its fine public buildings are a 13th century cruciform church (restored 1867), the grammar school (1653), and Blue Coat School (1723). Pop. about 3580. See *History of Witney* by Giles (1852), Monk (1894).

Witt, Dr., see DR. WITT, JAN.

Witte, Pieter de, called Pietro Candido (1518-1628), an historical painter, architect, and sculptor, born

at Bruges. He studied in Italy at Florence and Rome, assisting G. Vasari in the Vatican. Maximilian, elector of Bavaria, called him to Munich, where he executed some fine fresco works in the New Palace and Hofgarten galleries. His pictures include: 'Christ and His Disciples at Emmaus,' an 'Annunciation,' a 'Last Supper,' and 'Death of St. Ursula.' See Millin, *Dict. des Beaux-Arts*; Rée, *P. Candid*, 1885.

Witten, a tn. of Westphalia, Prussia, on the Ruhr, 14 m. from Essen. Situated among coalfields, it has steel, iron, and glass works, and manufs. chemicals, soap, beer, etc. Pop. about 35,840. See Hassel, *Willener Ortskunde und Ortsgesetze*, 1903.

Wittenberg, a tn. of Merseburg gov., Prussian Saxony, on the Elbe, about 59 m. from Berlin. The famous university (founded 1502) was incorporated with that of Halle (1817). The Court of the Augustinum (theological seminary) contains Luther's house, and that of Melancthon is near by. Luther preached in the Stadtkirche, and to the doors of the Schlosskirche (restored 1892) affixed his ninety-five theses against indulgences. W. possesses numerous paintings by Cranach. There are brick yards, iron foundries, breweries, dye works, manufs. of spirits, oils, woollen cloth, linen, leather, and hosiery, and fishing and gardening industries. Pop. about 20,330.

Wittenberge, a tn. in the prov. of Brandenburg, Prussia, on the Elbe. It is a centre of customs and has active industries in fishing and the manufacture of oil. Pop. nearly 18,500.

Wittingau (Bohemian Trebon), a tn. of Bohemia, Austria-Hungary, 14 m. from Budweis. Prince Schwarzenberg's castle (Lusnic Château) here contains valuable archives. Pop. about 5470.

Wittstock, a tn. of Brandenburg prov., Prussia, on the Dosse, 60 m. from Berlin. The textile industry flourishes. W. contains an ancient town-hall and interesting churches, and was the residence of the Bishop of Havelberg. The Imperialists and Saxons were defeated here by the Swedes under Bauer in 1636. Pop. about 7470.

Witu, or Vitu, a sultanate of Tana-land prov., British E. Africa Protectorate (since 1890), extending along the Indian Ocean. The capital, Witu, is 16 m. from Kipini, and its port, Mkonunibi, has a fine harbour in Manda Bay. Omar became sultan in 1895, and is guided by a British resident. There are extensive rubber plantations. Pop. (mainly Swahili) about 15,000.

Witwatersrand, see JOHANNESBURG. Woad, or *Isatis tinctoria*, a cruciferous plant, with yellow flowers and pendulous pods. It was formerly cultivated extensively for the dye, which it yields by fermentation of the leaves, and is still grown to a small extent.

Woburn: 1. A market tn. of Bedfordshire, England, 11 m. from Luton. It contains Woburn Abbey, the seat of the earls and dukes of Bedford (since 1517), on the site of a Cistercian abbey (1145), the present building dating from 1744. The abbey stands in Woburn Park, and has a valuable art collection. Some lace-making, straw-plaiting, and agriculture are carried on. Pop. (1911) 1122. 2. A tn. of Middlesex co., Massachusetts, U.S.A., 10 m. from Boston. There are two ancient burying grounds and a public library. Manufs. include leather, pianos, sandpaper, and belt knives. Pop. (1910) 15,308.

Woctin, a tn. of Austria, Moravia, with manufs. of cloth, furniture, and sugar. Pop. about 6500.

Wodehouse, John, see KIMBERLEY, JOHN WODEHOUSE, FIRST EARL OF.

Woden, see ODIN.

Woffington, Margaret, known familiarly as Peg Woffington (c. 1714-60), an Irish actress, played in Dublin from 1732-40. Her London debut was at Covent Garden under Rich in *The Recruiting Officer* (1740). She also acted at Drury Lane and lived for some years with Garrick. She often appeared in male characters, notably as Sir Harry Wildair in *The Constant Couple*. She excelled in comedy as a lady of high rank (Lady Plyant, Lady Betty Modish, Millamant, etc), but also acted in tragedy. See *Life* by Molloy (1884), Daly (privately printed, 1888); Doran, *English Stage*, ii.; Taylor and Reade, *Masks and Faces*, 1852; Reade, *P. Woffington* (introduction by Dobson), 1899; Tate Wilkinson, *Memoirs*.

Wöhler, Friedrich (1800-82), a German chemist, born in Eschersheim. He was aided greatly in his early studies by his father, and studied medicine at Marburg and Heidelberg, completing his chemical studies under Berzelius at Stockholm. From 1836 he was professor of chemistry in the medical faculty of Göttingen University. His discovery of cyanic acid and the preparation of urea from it was the first entry into the realm of organic chemistry. His researches in conjunction with Liebig on cyanic and cyanuric acid founded the theory of isomerism: their joint work led to the discovery of the benzoyl radical, another great step in organic chemistry. W.'s work on another side led him to the isolation

of the elements aluminium, beryllium, yttrium, and titanium. Amongst his writings are: *Grundriss der Unorganischen Chemie*, 1831; *Grund. der organischen Chem.*, 1832; *Praktische Übungen in der chem. analyse*, 1854. See Hoffmann, in *Berichte der Deut. Chem. Gesellschaft*, 1882.

Woking, a market tn. of Surrey, England, 6 m. from Guildford, 4 m. from Bisley Common, the volunteers' shooting headquarters since 1890. The London Necropolis Cemetery (1864) and Crematorium (1878) are at Brookwood, 3 m. distant. Near by are barracks, a home for disabled soldiers and sailors, and the Surrey county asylum. Pop. (1911) 24,808.

Wokingham, Oakingham, or Ockingham, a market tn. of Berkshire, England, bordering on Windsor Forest, 7 m. from Reading. There is an ancient parish church, a Gothic town-hall (1860), and the famous 'Rose' inn, where Pope, Swift, Gay, and Arbuthnot composed the ballad of *Molly Mog*. Some of the almshouses date from 1451. W. was noted for bull-baitings till about 1821, and became a municipal borough in 1885. An annual fair is held. Pop. (1911) 4352.

Wolcot, John (1738-1819), wrote satires and lampoons under the pseudonym of 'Peter Pindar,' which were very popular in their day and have still a considerable historical value. There is a breadth and licence about his writing that made him superior in this field to his many contemporaries. Among his best works are the *Lyric Odes to the Royal Academicians* and *The Lousiad*. The most complete edition of his works was published in 1812.

Wolf (*Canis Lupus*, Linn.). Lieut.-Colonel Hamilton Smith makes *Lupus* the first section of his first sub-genus, *Chæon*, of the *Diurnal Canidae*, or Canine group furnished with a round pupil of the eye. In this section he

W. (*Lupus rufus* Lycaon), *nubilus*, and n states of N. canus, Smith).

(*Lycisus*) he n W. (*Lycisus* of Mexico Jh). The common *Lupus*, of *his Lycaon* is

probably only a variety, is distributed throughout Europe generally and a great part of Asia.

Wolf, Ferdinand (1796-1866), a German romance scholar and writer, born in Vienna. He became librarian of the Imperial Library at Vienna (1819) and secretary of the Academy of Sciences there (1847). His most

important works include *Studien zur Gesch. der Spanischen und Portugiesischen Nationalliteratur* (1859; Span. trans. 1896); and works on Old French (Provençal, 1833) and Brazilian literature (1863). His *Kleinere Schriften* (Collected Papers) were edited by Stengel (1890). W.'s notes and supplement to the German trans. of Tiecknor's *Hist. of Spanish Lit.* (1852) were published by his son, Adolf (1867). See Mussafia, *Reihenfolge der Schriften F. Wolfs*, 1866.

Wolf, Friedrich August (1759-1824), a German classical scholar, born at Hainrode, near Nordhausen. It was at Nordhausen, under the guidance of Hake, that he conceived the love of antiquity which never forsook him. From the same scholar he also learned to depend for his conclusions primarily upon his own study and judgment. His love of private study brought him the disfavour of Heyne and others at the University of Göttingen, since it made his attendance at lectures extremely erratic. Though W. gave the best of his energies to the work of personal teaching, his literary production was great. In 1782 he published an annotated edition of Plato's *Symposium*, and this was the first of many editorial labours. In 1789 there appeared his *Prolegomena ad Homerum*, which gave a great impetus to the critical study of the Homeric poems. In April 1824 he went to France for the good of his health, and died at Marseilles.

Wolf, Hugo (1860-1903), a composer, born at Vienna. At an early age he entered the Conservatorium, where he made the acquaintance of Gustav Mahler. His life was uneventful, and was passed in the direst poverty. W. wrote an opera, *Der Corregidor* (1896), but it was a failure; and his two choral works with orchestra, *Die Christnacht* and *Der Fenerreitter*, are seldom heard; but he has achieved a great fame for his splendid songs, which number almost 500.

Wolf (or Wolff), Johann Christoph von (1683-1739), a Lutheran divine, born at Wernigerode, where his father was ecclesiastical superintendent. He became the friend and pupil of Johann Albrecht Fabricius, and in 1703 managed to get to the University of Wittenberg. He was finally appointed professor of oriental languages at Hamburg. His principal work was his *Bibliotheca Hebraica*.

Wolfe, Charles (1791-1823), an Irish poet and clergyman, ordained 1817. His best-known poem is *The Burial of Sir John Moore* (1816-17). His *Remains* with memoir by Russell appeared in 1825. Litton Falkner

edited his poems in 1903. See *Blackwood's Mag.* (March 1826); *Notes and Queries*, 7th and 8th series; O'Sullivan's *College Recollections* (1825).

Wolfe, James (1727-59), a soldier, entered the army in 1741, and six years later saw service in Flanders. In 1757 he was quartermaster-general of the force which Mordaunt led against Rochefort, and in the following year was given the command of a brigade which was to be sent against Louisburg. He returned to England in November, and in the following year was promoted major-general and given command of the army sent up the St. Lawrence against Quebec. He was shot during the battle on the Plains of Abraham, and died in the hour of victory.

Wolfenbüttel, an ancient tn. of Brunswick duchy, Germany, on the Oker, 8 m. from Brunswick. The library, built in imitation of the Roman Pantheon (1723), where Lessing was librarian (1770-81), was transferred to a new Renaissance building (1887). (The *Wolfenbüttel Fragments* of Reimarus were edited by Lessing.) Machinery, leather, cork, and copper goods, preserves, cloth, and tobacco are manufactured. The Swedes defeated the Austrians here in the Thirty Years' War (1641). Pop. about 19,030.

Wolff, Joseph (1795-1862), a missionary, born at Bamberg, educated at Berlin, Rome, and Cambridge. In early life a Roman Catholic, in 1838 he became converted to Anglicanism. Volunteering as a missionary, he travelled widely over the Near East, his striking personality and persuasive eloquence being responsible for many conversions, though among the Jews his labours were less successful. He wrote several books describing his travels.

Wolf-hound, see BORZOI.

Wolfram, see TUNGSTEN.

Wolfram von Eschenbach (c. 1170-c. 1220), a poet or minnesinger of medieval Germany, a native of Bavaria. He was the greatest poet before the revival of German literature, and his *Parzival* (c. 1205), dealing with the quest of the Holy Grail, is considered one of the finest German productions of the middle ages. In part it closely follows the *Perceval* of Chrétien de Troyes, but W. claims to have based his version on that of an unidentified knight of Provence. W. also wrote *Titurel*, a fragmentary introduction to the *Parzival*; *Willehalm von Oransie* (c. 1216, an epic from the French *Aliscans*); and lyrics, *Wälder (Tag) Lieder*.

Wolf Rock, a rock about 117 ft. high, 8 m. from Land's End, Cornwall, England, with a lighthouse.

Wolf's-bane (*Aconitum Napellus*), a common purplish blue-flowered garden plant, so called from its use as a poison for wolves.

Wolgast, a seaport of Pomerania, Prussia, on the Peene, 33 m. from Stralsund. It was ceded to Sweden (1648), and after changing hands many times became subject to Germany (1815). Steel, chemicals, tobacco, and alcohol are produced. Pop. about 8350. See Heberlein, *Beiträge zur Gesch. der Burg und Stadt Wolgast*, 1892.

Wolgmut (or Wohlgemuth), Michael (1434-1519), a German painter, chief of the early school of Franconia. His stepson Pleydenwurff assisted him in his large workshop, and together they prepared the woodcuts for the *Schedelschen Weltchronik*: (1493-94) and Koherger's *Schatzkammer* . . ., 1491. His works include a 'Last Judgment' at Nuremberg, and 'St. Jerome' (Vienna Gallery). W. is thought to have engraved on copper and wood.

Wollaston, Thomas Hyde (1766-1828), an English natural philosopher and chemist, born at E. Dereham. He took his medical degree from Caius College, Cambridge. Not succeeding in his profession, he turned his attention to chemistry, particularly in connection with platinum, palladium, and rhodium, and to optical invention. He was elected F.R.S. in 1793, and secretary to the society in 1806. Apart from these activities he led a severely retired life. He received the royal medal of the society for his method of manufacturing platinum and rendering it available for instruments (particularly crucibles). He is noted as the inventor of the camera lucida, and the goniometer, and for the discovery of dark lines on the solar spectrum, 1802. He founded the donation fund of the Royal Society, the Wollaston medal of the Geological Society, and served as a commissioner of the Royal Society on the Board of Longitude.

Wollin, an island of Pomerania, Prussia, on the Great Haff, with Usedom separating the Stettiner Haff from the Baltic. It is about 30 m. from Stettin, opposite the Oder's mouth. Wollin (pop. about 5000) on the Dievenow is the chief town. Pop. about 15,000.

Wollongong, a seaside resort of Camden co., New South Wales, Australia, 7 m. from Lake Illawarra, and about 47 m. from Sydney, with trade in coal. Pop. about 3500.

Wollstonecraft, Mary, see GODWIN, MARY WOLLSTONE.

Wolseley, Garnet Joseph Wolseley, Viscount (1833-1913), a distinguished

soldier, born at Golden Bridge House, co. Dublin, of an old Staffordshire family. He was educated privately, and entered the army in 1852. A long career of active service commenced with the Burmese War of 1853, during which he was severely wounded in the left thigh. He was again wounded in the Crimea, where he served with the 90th Light Infantry. He received the cross of the Legion of Honour for bravery, and became captain at the age of twenty-two. He was present at the relief of Lucknow and at other engagements in the Indian Mutiny, becoming lieut.-col. at the close of the war. He commanded the Canadian Red River expedition of 1870, and took part in the Ashanti War of 1873, receiving the thanks of parliament and various honours on his return home. In 1882 he was raised to the peerage (created viscount, 1885). About this time he was engaged in Egypt, won the battle of Tel-el-Kebir in 1882, and commanded the expedition which attempted to relieve General Gordon in 1884-85. He became commander-in-chief in Ireland in 1890, was made field-marshal in 1894, and from 1895 till 1900 was in the forces.

Pocket-book:

Life of the Duke of Marlborough, 1894; Decline and Fall of Napoleon, 1895; The Story of a Soldier's Life, 1903, etc.

Wolsey, Thomas (c. 1475-1530), a cardinal said to have been the son of a butcher, was educated at Magdalen College, Oxford, and took holy orders. He was presented to the living of Limington in 1500, and in the next year was appointed domestic chaplain to Henry Deane, Archbishop of Canterbury. Henry VII. made him one of his chaplains in 1507, and preferment followed preferment rapidly. He was made dean of Lincoln in 1509, canon of Windsor in 1511, dean of Hereford in 1512, and of York the next year, bishop of Lincoln in 1514, and later in the year archbishop of York. Leo X. created him a cardinal in 1515. He had now for some time been consulted by the king on temporal matters. He directed the plan of a campaign against France in 1512, arranged the treaty of 1512 with that country, and accompanied Henry to the Field of the Cloth of Gold. He was indeed virtually prime minister, and went as ambassador-extraordinary to France to conclude the peace of Amiens in 1527. He sided with the king in the matter of the divorce of Catherine of Aragon, but, owing to delays in the proceedings, fell into disgrace, and was indicted in 1529, but pardoned the following year. In

the last year of his life he was arrested for high treason, and died at Leicester on his way to London to refute the charge. There are biographies by Cavendish and Galt.

Wolsingham, a small tn. of Durham, England, 13 m. from Durham, with an observatory. It is at the confluence of the Wear and Wascrow Beck. W. is in a mining district, has marble quarries, and manufactures hardware and woollens. It is a civil parish of Weardale. Pop. (1911) 3414.

Wolstanton, a suburb of Stoke-

tween Etruria and Longport stations. Pop. (1911) 27,335.

Wolverene, see GLUTTON.

Wolverhampton (Handoac, *W'il-frunohamton*), a municipal and parl. bor. of Staffordshire, England, 12 m. from Birmingham. It contains a free grammar school (founded 1515), a Blue Coat school (1710), a school of art, and various benevolent institutions. St. Mary's Church (later the Royal Free Chapel) was founded about 996. St. Peter's Church is old in parts, but was rebuilt (1865). The capital of the 'Black Country,' W. has numerous blast furnaces, foundries, and collieries, and manufactures locks, japanned goods, hardware, tools, motor cars and cycles, electrical machinery and plant, etc. Pop. (1911) 95,328.

Wolverton, a small tn. of Buckinghamshire, England, 9 m. from Buckingham, near the Ouse. It has fine railway carriage shops and printing works. It is connected by steam tramway with Stony Stratford, 2 m. distant. Pop. (1911) 7381.

Womb, see UTERUS.

Wombwell, a tn. of the W. Ridg. Yorkshire, England, 4 m. from Barnsley, with extensive coal mines. Pop. about 13,260.

Women's Suffrage. The movement for the extension of the franchise to women, though in its militant and organised aspect an event of the present decade only, may be said to have had its intellectual origin in J. S. Mill's plea for perfect equality of the sexes in the essay entitled *The Subjection of Women* (1869). Mill held that 'the principle which regulates the existing social relations between the two sexes—the legal subordination of one sex to the other—is wrong in itself, and now one of the chief hindrances to human improvement; and that it ought to be replaced by a principle of perfect equality, admitting no power or privilege on the one side, nor disability on the other.' One effect such opinions as those of Mill had was the removal by the Married

Women's Property Act, 1882, of the disability under which a woman laboured prior to that Act of acquiring any property of her own. All that a woman could gain, whether by inheritance or otherwise, became *ipso facto* the property of her husband. As the law now stands women are in a position of almost absolute equality with men in respect of their proprietary relationships. Politically their status is yet far inferior to that of men, in spite of the fact that the municipal franchise has been extended to them, and that local offices of such dignity as mayoralties are open to them without restriction. It is not the purpose of this brief notice of the topic of W. S. to weigh or even to give the principal current arguments for and against the extension to women of the parliamentary franchise. Those arguments have been and are now so constantly reiterated from public platforms and the press of to-day that it may be assumed they are common knowledge. (The arguments against W. S. will be found well set out in Mr. Heber Hart's book, *Women's Suffrage: A National Danger*, 1913.)

It can be said here is that leading men of all shades of political opinion appear to be of one mind on the logical absurdity of denying to women the right to vote, a consensus of opinion that has been amply demonstrated by the fact that W. S. for the twenty-five years between 1886 and 1911 was never once defeated in the House of Commons. Bills on W. S. passed their second readings six times between 1886 and 1911, but never proceeded beyond that stage. The debate in March 1907 on Mr. W. H. Dickinson's Bill resulted in that Bill being 'talked out.' In March 1912 the Conciliation Bill was defeated by the narrow majority of fourteen, a defeat which Mrs. Fawcett attributes with much truth to the militant tactics of the Women's Social and Political Union, the absence of twelve Labour members during the coal strike of that year, and the defection of the Irish members, who feared that the passing of the Bill would cause the Liberal government to resign and thus destroy their hopes of seeing the Home Rule Bill become law. The debate in 1913 on the amendments to the Government Franchise Bill of 1912 is the last occasion on which W. S. has been before parliament, and it must be conceded, perhaps, that an air of unreality pervaded this last debate, which, specifically stated, turned on the resolution to omit the word 'male' in the first line of the first sub-section to clause one of the Bill (which ran,

'Every male person over 21 is qualified for registration in a constituency as a parliamentary elector if he resides or is an occupier of land or premises in that constituency,' etc.). Whether the academic listlessness that characterised the debate was to be attributed to the pressing demands on the time of the government exacted by the Home Rule Bill and other dominant issues, or to the extraordinary outbursts of organised violence, extending to depredations on private property, of the militant section of the supporters of female suffrage, may be an open question. At all events, the loss of the amendment resulted in further violence and a series of incendiary outrages on country mansions, the consequence of which was the raiding of the headquarters of the Women's Social and Political Union by the police. This raid on the union's papers and the decision of the High Court, which held the funds of the union liable to answer damages for destruction of property by their agents, would appear to have effectually for a time buried the whole movement. Arising out of the continual breach of the law by the militant 'suffragettes' and the consequent wholesale imprisonment of large batches of women, parliament passed an Act, colloquially termed the 'Cat and Mouse Act,' which had for its object the rendering effective the imprisonment of women who nullified their sentences by 'hunger striking,' and defying all efforts forcibly to feed them in prison. In view of the overshadowing effect of these active steps against the militancy of the suffragists, it is difficult to state precisely the policy of the *National Women's Social and Political Union*. The election policy of the National Union of Women's Suffrage Societies is best stated in the words of Mrs. Fawcett, 'to support in a contested election the best friend of Women's Suffrage to whatever party he may belong.' As the Labour party (particularly Mr. Lansbury) has identified itself with W. S., this means that the whole-hearted support of the N.U.W.S.S. will always be given to a Labour candidate unless some other party candidate can show strong reasons for giving the union ground to believe in the *bona fides* of his support. See M. G. Fawcett, *Women's Suffrage* (People's Books), 1913.

Wōn-san, or Gensan (Chinese *Fuan-shan*), a treaty port at the head of Broughton Bay (Port Lazareff), on the E. coast of Korea, Japan. Hides, fish, and gold are exported. The Japanese control most of the trade. There is direct steamship communication with Japan Shanghai, Vladivos-

tock, and other ports. Pop. about 20,000.

Wooburn, a par. of Wycombe div., Buckinghamshire, England, 7½ m. from Windsor, with paper and mill-board mills. Pop. (1911) 4047.

Wood, in the widest sense, is all that part of a plant that exists between the pith and the bark; in a narrower sense, it is applied only to those bundles of tissue which are called woody tissue. The two great classes of plants, Exogens and Endogens, yield very different kinds of W. in consequence of the manner in which their fibres are deposited. Endogens have no bark and are generally hollow in the middle. The stems of Exogens are solid, and as the tree increases in age the W. becomes more solid. Hence a distinction is made between the centre of the W. of the trunk and its circumference, the one being called heart-wood, the other sap-wood.

Wood (or a Wood), Anthony (1632-95), an antiquary, born at Oxford, and educated at Merton College. Dugdale's *Antiquities of Warwickshire* roused him to attempt the same task for Oxfordshire, and after six years' labour finished his work continued with evidence from the Edwardian period. (Hist. Soc.), 1891-97.

Wood, Ellen (better known as Mrs. Henry Wood) (1814-87), a novelist, contributed to the *New Monthly Magazine*, in 1861, her first work of fiction, *East Lynne*, which at once established her as a popular writer. Among her numerous stories are *Mrs. Halliburton's Troubles* (1862), *The Channings* (1866), *Within the Maze* (1872). The *Johnny Ludlow* tales were contributed in 1868 to the *Argosy Magazine*, of which she was proprietor and editor. Mrs. Henry Wood invented excellent plots, but her novels are without literary distinction. They had, and still have, an enormous circulation. *East Lynne* is the most popular, and it has several times been successfully dramatised.

Wood, Sir Evelyn (b. 1838), a British general, born at Cressing Vleage, Essex, the son of the Rev. Sir J. P. Wood. He first served in the navy, which he entered in 1852, and was with the Naval Brigade in the Crimea. Transferring his service to the army, he gained the Victoria Cross during the Indian Mutiny, and, having changed again from cavalry to infantry, he served through the Ashanti War with the rank of Lieutenant-

colonel. The Zulu War found him in the field again, and he commanded in the Boer War of 1881. In 1883 he raised the Egyptian army, becoming its commander-in-chief, and he served in the Nile Expedition of 1894-95. From 1893-97 he was Quartermaster-General of the Forces, and from 1897-1901 he was Adjutant-General of the Forces. He commanded the Second Army Corps and Southern Command from 1901-4, and in 1903 was made a field-marshal. When the territorial force was formed he took an active part in its organisation, becoming chairman of the City of London Association. He was G.C.M.G. (1882) and G.C.B. (1897). See his autobiography, *From Midshipman to Field-Marshal*.

Wood, John George (1827-89), a writer of natural history, born in London, educated at home and at Oxford. He took holy orders and held some minor appointments, but devoted himself chiefly to literary work. He gave many lectures in England and America, and produced a long series of popular works on zoology, among them *My Feathered Friends*, a 'Common Objects' series, *Bees*, *The Natural Hist. of Man*, etc. See *Life* by his son.

Woodbine, a name formerly given to twining and climbing plants, including ivy. Shakespeare used it of the honeysuckle, but it is also applied to *Polygonum convolvulus*.

Woodbridge, a river-port and market town of Suffolk, England, at the head of the Deben's estuary, forming a sub-port of Ipswich (8 m. distant). Pop. (1911) 4623.

Woodbury, Walter Bentley (1831-85), the inventor of the Woodbury-type process and other processes for photo-mechanical printing and photographic apparatus. He was born at Manchester, and had a scientific education. Among his intimate friends were Simpson and Pritchard, who were also photographic pioneers. See Harrison's *Hist. of Photography*.

Woodburytype, see PHOTOGRAPHY, PROCESS WOOD.

Wood-carving, see CARVING.

Woodchat, or Woodchat Shrike (*Lanius curculatus*), a shrike, native of Africa, which occasionally visits Britain. It is about 7 in. long, and its colour is mainly black and white with a reddish head.

Woodchuck, see MARMOTS.

Woodcock, or *Scolopax rusticola*, a game bird, which in recent years has become much more numerous in Britain, and breeds in most counties. It is a favourite bird with sportsmen and is much valued for the table. The great majority occurring in Britain are migrants, arriving chiefly in

October. The ability of the parent birds to carry their young, pressed between the legs and breast, to feeding grounds, has long been established by naturalists. The W. is about 14 in. long, and its plumage is brown grey and buff with black markings. The American W. is *Philohela minor*.

Woodford, an urban sanitary dist. and tn. of Walthamstow div., Essex, England, 8 m. from St. Paul's, London. Pop. about 13,800 (with Woodford St. Mary, Woodford Bridge, Woodford Wells, Woodford Green).

Wood Green, a tn. and eccles. par. of Middlesex, England, 6½ m. from St. Paul's, London. The Alexandra Park and Palace are close by. Pop. (1911) 49,369.

Woodhouse, an eccles. par. of the W. Riding of Yorkshire, England, 4 m. from Sheffield. W. Mill Station is 1½ m. distant.

Woodhouse, Robert (1773-1827), an English astronomer, Lucasian professor of mathematics at Cambridge (1820), Plumian professor of astronomy (1822), and director of the observatory (1824). He published: *Plane and Spherical Trigonometry*, 1809; *A Treatise on Astronomy*, 1818-23; *Isoperimetrical Problems* . . ., 1810. See Knight's *Penny Cyclop.*, 1843; Ball, *Hist. of Maths. at Cambridge*, 1889.

Woodhouselee, see TYTLER, ALEXANDER FRASER.

Wood-ibis, see TANTALUS.

Wood-lice, name given to isopod crustaceans of the family Oniscidæ. Though they have all become adapted to terrestrial life, they find damp necessary to their existence, and some species, notably *Ligia oceanica*, which is over 1 in. long, are confined to the seashore. The food of W. is entirely vegetarian, and they are mainly nocturnal in their habits. The oval body consists of a small head, seven-segmented thorax, each segment bearing a pair of legs, and abdomen, the appendages of which are the respiratory organs. *Oniscus armadillo* does damage in gardens.

Wood Naphtha, see PYROXYLIC.

Wood Oil, see GERJUN BALM.

Woodpeckers (Picidæ), a family of Scansorial birds. The Picidæ are especially constructed for climbing up the bark of trees, and for obtaining from the crevices thereof the insects which constitute their food. The feet, though very short, are unusually strong; the nails are broad and crooked, and the toes placed in pairs, that is, two forward and two backward. As an additional and powerful support in their ascent of the trunks of trees, their tail feathers terminate in points, and are uncommonly

hard, so that when they are pressed against the bark they assist the birds in their progress or in keeping their position. The bill is wedge-shaped, furnished with regular-sided angles, and in one species (*Picus principalis*) nearly of the colour and consistency of ivory, whence it has been termed the ivory-billed W.

Wood-preserving, see TIMBER.

Wood-pulp consists of wood fibre which has been reduced to a pulp either mechanically, by grinding wood under water, or chemically, by boiling small pieces of the wood with caustic soda or calcium bisulphite under pressure. The wood most generally used is poplar, and the pulp is used in the manuf. of paper (q.v.).

Woodruff, or *Asperula*, a genus of small plants (order Rubiaceæ). The sweet W. (*A. odorata*) is a common perennial in woods and is often gathered and dried for its persistent odour of new-mown hay.

Wood's Halfpence, see WOOD, WILLIAM.

Wood-sorrel, see SORREL.

Wood-spirit, see PYROXYLIC.

Woods and Forests. The real property of the crown consists partly of a number of royal forests, the chief of which is the New Forest, comprising some 50,000 acres. Formerly the principal source of profit from the W. and F. lay in the fines levied for offences against the Forest Laws (see FORESTS). At the present day the term W. and F. is applied somewhat indiscriminately to that state department which collects the rents and profits of the crown's hereditary estates, which revenues in 1760 were transferred to the nation in exchange for a civil list allowance.

Woodstock: 1. A market tn. and municipal bor. of Oxfordshire, England, on the Glyme, 8 m. from Oxford. W. was the residence of some of the English kings. After Blenheim (1704), the place was granted to the Duke of Marlborough, Blenheim Palace being erected near by. Pop. (1911) 1594. 2. A port of entry and summer resort of Ontario, Canada, cap. of Oxford co., on Cedar Creek, 26 m. from London. Leather, furniture, automobiles, and pianos are manufactured. Pop. about 8800.

Woodward, John (1665-1728), an English physician and naturalist, one of the founders of modern geological science. He was professor of physics at Gresham College (1692). He first took up the study of fossils during a stay in Gloucestershire. He wrote: *Essay toward a Nat. Hist. of the Earth* . . . (1695), *Fossils of all kinds* . . . (1725), and similar works. W. bequeathed his collections to Cambridge University and founded the

Woodwardian chair of geology. See Clark and Hughes, *Life and Letters of the Rev. A. Sedgwick*, i.

Woodwork, a term applied mainly to the various processes of decorating wood, but also to the making of artificial woods. Wood-carving is an art in itself and has elaborate tools. The simple working of patterns by means of gouges or chisels is one of the commonest forms, the patterns usually being built up of 'single strokes' of the tool. Often the raised pattern or the intaglio may be 'spotted' by hammering with a punch. Much imitation wood-carving is now done by stamping with metal moulds under great pressure. Venetian marquetry is handworked with a pen-knife, the raised portions being coloured and polished, the intaglio filled with black wax. Parquetry is inlaid W., the patterns being developed from separate pieces of wood cut to shape. Poker work or pyrography is done with a hot needle, the pattern being burnt in. Artificial woods are made from sawdust or shavings. A tough and strong form is prepared by adding short lengths of bruised wood fibre; this is used for the curved portions of furniture as it can be moulded to shape.

Wookey Hole, a vil. of Somersetshire, England, about 2 m. from Wells, included in Wookey parish. The noted W. H. cavern is 2 m. away. Pop. (parish) about 1000.

Wool, the soft, curly form of hair worn by some animals, useful to them in preventing loss of body heat, and adapted by man to the manufacture of textiles for clothing. From the biological point of view, there is no definite line to be drawn between hair and W. Hair is the general term for that outgrowth of the epidermis found in most mammals and serving as a coat, while W. comprises those fibres which have a particularly curly or wavy appearance. Thus the coats of the merino and English breeds of sheep are *par excellence* known as W., while the term is also applied to the fibres obtained from the llama, the Peruvian sheep, the Angora goat, and, perhaps more debatably, to cashmere and camels' hair. Microscopically, W. is distinguished by the possession of a serrated structure. The core of the fibre is enclosed in numerous funnel-shaped sheaths which overlap each other, producing the saw-like outline which is only perceptible under the microscope. The serrations are most numerous in the finest Ws., and it is to the existence of these minute irregularities that W. owes its property of matting or felting into a compact mass, and,

consequently, its value as a fibre for textiles. Chemically, W. consists of carbon, hydrogen, nitrogen, oxygen, and sulphur. When burnt it gives off an odour of ammonia gas, and leaves as a residue small bead-like masses of carbon. This latter property serves to distinguish it from vegetable fibres, such as cotton, which leave no perceptible masses of carbon when burnt. The properties desired in W. for manufacturing purposes are length of staple, staple being a lock or matted collection of fibres, strength and uniformity of fibre, elasticity, lustre, fineness of fibre, and freedom from impurities in the shape of dead fibres, foreign matter, etc. The weaving of woollen fibres appears to have been practised at a very early date. Herodotus mentions that the Babylonians were clothed in woollen tunics, and the Hellenic peoples were well versed in the art. The sheep was a domestic animal among the early Britons, and there is little doubt that they wore woollen garments, fashioned either by weaving or by beating masses of W. into felt. The Romans understood all the essentials of the W. manufacturer's craft as it is practised to-day, and they carried their knowledge into the countries conquered and settled by them. A woollen factory was established in Winchester in Roman times, and its products were known and appreciated on the continent of Europe. Throughout the middle ages, however, the chief centres of the woollen manufacture were on the continent, notably in Flanders. Efforts were made at various times to establish the industry securely in Britain. Flemish weavers were introduced into Carlisle under royal protection in the reign of William I., and a colony was afterwards founded in Pembrokeshire. The W. grown in the north of England was exported to Flanders, and the prohibition was so stimulating that the export of W. was forbidden. The constant encouragement given to woollen manufacturers led to large areas being turned into pasture land for the provision of the raw material, with the result that English industry took a bias against the more intensive forms of agriculture which has had far-reaching effects. The development of machinery and the factory system had the effect of concentrating the greater part of the industry on the northern coal fields, and the southern centres gradually dwindled or persisted as seats for the manufacture of

certain specialised products. In later years the supply of the raw material from Britain and Europe has been almost negligible, the chief importations being from Australia, New Zealand, and S. Africa. In America the woollen manufacture was not established on factory lines until the end of the 18th century. The breed of sheep recognised as the best for W. purposes is the merino. Originally a Spanish sheep, it has made its way into all quarters of the world. In 1765 it was introduced into Saxony and crossed with the best Saxon breeds. Subsequently it was introduced into other parts of Europe, and, in 1809, 4000 were imported into the United States. They were introduced into Australia at the end of the 18th century, and the colonists set about growing W. to supply the European market. The enterprise was not at first a success, but owing to the efforts of men like Captain MacArthur the quality of the W. and facilities for commerce were much improved. When the frozen-meat trade occupied so much attention in Australia and New Zealand, the danger arose that the good qualities of the sheep as regards W. would be sacrificed to mutton. The danger has been averted, owing mainly to improved knowledge of breeding from the scientific point of view. Good cross-bred W. is now exported from the coastal districts, while the native merino still holds its own in the interior. An attempt has been made to supplement the Australian merino strain with the Vermont, or American merino, but the heat and dryness of the climate are all against the American sheep. The merino was introduced into S. America at a later date, and was crossed with French breeds. Lately the introduction of English breeds has had the effect of producing a good cross-bred W. The Dutch introduced the merino into S. Africa, where it has flourished with little need for cross-breeding. The woollen manufacture is divided into the 'woollen' and 'worsted' trades, the general distinction being that in the latter long fibres are used. In the woollen trade not only are short fibres employed, but all kinds of remanufactured materials and by-products are used. These comprise *noil*, the short fibres rejected in the combing operation for worsteds; *mungo*, the shreds of previously manufactured clothing; *shoddy*, the shreds of softer materials, as blankets, shawls, etc.; *flocks*, collections of fibre from the machines used in the various processes. Sheep's W. is often washed before shearing; the process naturally rids the fleece of

extraneous dirt, but as it also removes much of the natural grease, there is a tendency towards the opinion that the operation is best omitted. In shearing, the fleece should be clipped off in one continuous piece, the W. being rolled up and secured by a simple knot. The fleeces are then classified as regards quality as a preliminary to the work of the sorter or stapler, who divides each fleece into separate qualities, as the W. deteriorates in value from the shoulders to the tail of the animal. The operation of sorting requires a high degree of discrimination, and, it may be added, a regard for cleanliness, as anthrax is not uncommonly contracted through infection from the W. of diseased sheep. Whether the sheep have been washed prior to shearing or not, it is necessary to wash or 'seour' the W. before proceeding to the manufacture. This is done by agitating the W. with suitable machinery in a bath containing a mild alkali. It is then uniformly dried, usually by steam heat. The next operation is to disentangle the matted fibres of the fleece. To effect this the W. is fed into a 'Willey,' consisting of a large drum and three small cylinders armed with spikes, in such a manner that the entangled fibres are pulled apart as they pass between the cylinders. W. is then usually 'blended.' That is, Ws. of different kinds and W. substitutes, in proportions suitable for the purpose in view, are spread in layers forming a stack, each layer being oiled as it is put down. The stack is beaten down with sticks, after which it is passed through a *fearnought* to ensure that the various fibres are adequately mixed. 'Scribbling' or 'carding' is an important operation by which the mass of fibres is still more perfectly mixed and rendered into a condition suitable for spinning. The carding machine consists of a series of rollers set with pins somewhat bent. The wool is taken up from the feed by the first cylinder or 'lieker-in' and is stripped from that by another cylinder, or 'angle stripper,' from which it is removed by the pins of a large cylinder usually called the 'swift.' As the W. is carried forward by the swift, all fibres which do not lie closely on the cylinder are removed by 'workers,' cylinders from which the fibres are removed by still more cylinders to a point further back on the swift. It is seen, therefore, that only fibres setting close to the cylinder survive to be taken off by the 'doffer.' Essentially, the carder consists of a number of cylinders with an enormous number of teeth which work the W. into a 'sliver,' a con-

tinuous film of fibres. The film is divided up into narrow strips which are passed between rubbers so as to give a circular section. The sliver is now a long rod of pith-like W., with no twist, and therefore capable of being stretched to a considerable extent. The attenuation and twisting required to convert the sliver into yarn of the requisite count is performed by means of the 'spinning mule,' a machine of somewhat complicated construction, though the operation is simple. For the preparation of worsted yarn, an operation known as 'combing' is necessary. This is performed by a machine which separates all the fibres above a certain length from the mass and imparts a high degree of parallelism to them. After spinning, therefore, worsted yarn presents a clearer cut appearance than woollen yarn, which remains fluffy in appearance. The principles of weaving are similar to those employed in other textiles. Dyeing may be performed at almost any stage of the process, given the necessary cleansing preliminaries. Certain finishing operations, as mending, scouring, tentering, etc., vary according to the nature of the fabric. Woollen cloths are known as tweeds, meltons, doeskins, buckskins, etc., and are characterised by softness and elasticity. Worsted forms the largest class of suit and dress materials; they make up with excellent finish, keep their shape well, but are apt to become glossy with wear. See *McLaren, Woollen and Worsted Spinning*; A. F. Barker. *Textiles*.

Wooler, a small tn. and health resort of Northumberland, England, on the slope of the Cheviots, 15 m. from Berwick-on-Tweed. There are ancient remains near. Pop. 1500.

Woollett, William (1735-85), an English engraver and draughtsman; excelled as a landscape engraver. Among his plates are: 'Temple of Apollo,' after Claudio (1760), R. Wilson's 'Niobe' (1761), both published by Boydell, West's 'Death of General Wolfe' (1776), 'Battle of La Hogue' (1781). W. was appointed engraver to George III. (1775).

Woolman, John (1720-72), an American Quaker essayist and preacher; spent his life after about 1713 in preaching against slavery and espousing the cause of negroes and Indians. He came to England (1772) to visit Friends in London, York, and elsewhere. His writings include his *Journal* . . . 1775 (ed. with Whit-tier's Introduction 1871); *Considerations on Various Subjects of Importance* . . . 1773; *A Word of Remembrance and Caution to the Rich*, 1793. See his *Collected Works*, 1774-

75, 1800; the pamphlet *St. John Woolman* (London), 1861.

Woolsack, the seat of the Lord High Chancellor (see under CHANCELLOR) in the House of Lords, being a large square bag of wool, without back or arms, covered with red cloth. According to Dr. Brewer (*Dictionary of Phrase and Fable*) Ws. were placed in the peers' house for the accommodation of the judges as a constant reminder of the fact that wool, the exportation of which was forbidden by Act of Parliament, was a great source of our national wealth, hence, that the Lord Chancellor is said to be 'appointed to the woolsack.'

Woolsey, Theodore Dwight (1801-89), an American educationalist, publicist, and Congregational minister; studied at Yale, Princeton theological seminary, and in Germany (1827-30). He became president at Yale (1846-71), and was chairman of the American Commission for revising the A.V. of the N.T. (1871-81). He edited Plato's *Gorgias* and plays of the great Greek tragedians, and wrote: *Introduction to the Study of International Law*, 1860; *Communism and Socialism*, 1880; and *Political Science* . . . 1877.

Woolsorter's Disease, see ANTHRAX. Woolton and Much Woolton, a par. and tn. of Lancashire, England, 5 m. from Liverpool, of which it forms a residential suburb. Little Woolton is 1½ m. from Gateacre Station.

Woolwich, formerly a separate tn. of Kent (partly also in Essex, N. Woolwich) on the Thames, now included in the metropolis (S.E.), 7 m. from St. Paul's. Greenwich and Lewisham bound it on the W. The borough (with Eltham and Plumstead) returns one member to parliament (since 1885). The famous Royal Arsenal (E.), with its foundry, furnaces, pattern room, and laboratory, developed from the armoury at Tower House in Woolwich Warren (established 1585). The cannon foundry was moved from Moorsfields to W. (about 1716) under the direction of Andrew Schuch of Douai. Other important buildings are the Royal Military Academy (1719, present building dating from 1805), the Artillery Barracks (1775), Royal Artillery College, Royal Military Repository, and the Reindeer. The brook fever hospital is at Shooter's Hill. Woolwich Dockyard rose to great importance under Henry VIII., but was closed (1869) and made over to the War Office as a depot (1872). There are brick and tile kilns and pits of chalk and sand, and many Roman remains have been discovered near by. Pop. (1911) 121,376.

Woonsocket, a city of Providence co., Rhode Is. (N.), U.S.A., on Blackstone R., about 15 m. from Providence. Centre of a group of manufacturing villages it produces cottons, worsteds, bobbins and shuttles, india-rubber goods, and foundry products. Pop. (1910) 38,125.

Woorali, another name for eurare (q.v.).

Wooster, cap. of Wayne co., Ohio, U.S.A., on Killbuck Creek, about 50 m. from Cleveland. Agricultural machinery is manufactured. It contains the (Presbyterian) University of W. (1870), and the Ohio agricultural experiment station. There are coal, lumber, and glass industries. Pop. (1910) 6136.

Worcester (Saxon, *Hwicwara-ceaster*): 1. A parl., co., and municipal bor., episcopal city, market tn., and cap. of Worcestershire, England, on the Severn, 25 m. from Birmingham. It contains an ancient cathedral, a grammar school (1541), and other notable buildings. Every three years the musical festival of the 'Three Choirs' is held here (other years at Gloucester or Hereford). The Royal Worcester Porcelain Works (1751) are noted. Worcester saueo, vinegar, chemicals, and gloves are manufactured also, and there are iron and engine works. Cromwell here defeated Charles II. (1651). Pop. (1911) 47,982. See works by Green (1796), Noake (1849), Waleott (1866), Smith and Onslow (1883); *Victoria County History*. 2. A tn. and dist. of Cape Colony, S. Africa, on the Breede and Hex rivers, 60 m. from Cape Town. Much wine and brandy are produced; there are tanneries and wagon works, and thermal springs near (at Brandvlei). Pop. (1911) 8000. 3. With Fitchburg, cap. of Worcester co., Massachusetts, U.S.A., 44 m. from Boston. The Blackstone, Chicopee, and other rivers afford a plentiful water supply. There are fine public buildings and parks, loom and envelope manufactories, foundries, wire works, wool and silk mills, and manufs. of tools, firearms, boots and shoes, and carpets. W. was known as 'Quinsigamond' till 1684. Pop. (1910) 115,986. See *History of Worcester* by Hersey (1862) and Hurd (1889).

Worcester, Edward Somerset, second Marquis of (1601-67), an English royalist, known as Lord Herbert till 1644, and as Earl of Glamorgan (1644-46). He served King Charles in Ireland (1644-45), but his secret negotiations with the Irish Roman Catholics miscarried, Charles refused to support him, and he was imprisoned. He lived in France from 1648-52, when he was again imprisoned for a time. His mathe-

matical and mechanical researches were conducted with the help of C. Kalkoff, and he invented a kind of steam-engine for 'driving up water by fire,' described in his *Century of the Names and Scantlings of Inventions* . . . (first printed 1663). He erected water-works at Vauxhall.

Worcester, Florence of, see FLOR-ENCE OF WORCESTER.

Worcester, Joseph Emerson (1784-1865), an American lexicographer, editor of the *American Almanac* (1831-43). He published a *Universal Gazetteer* (1817), *Gazetteer of U. S.* (1818), edited Johnson's *Dictionary* (1828), and abridged Webster's *American Dict.* (1829). His *Universal and Critical Dict.* (1846) was enlarged to the great quarto illustrated *Dict. of the English Language* (1860, 1881). See Allibone, *Dict. of Authors*; *North American Review* (Jan. 1847).

Worcester College, one of the colleges of Oxford University, in Worcester Street, founded (1714) by Cooke's bequest. The site was partly occupied as early as 1283 by Gloucester Hall (founded for Benedictine monks). In 1542 this was used as the palace of the Bishop of Oxford. The present provost (1913) is C. H. O. Daniel. See *Oxford University Calendar*; Clark, *Colleges of Oxford*. 1891; Smith (1895), Wells (1899); Headlam, *Oxford and its Story*, 1904.

Worcestershire, a midland co. of England, bounded N. by Staffordshire, S. by Gloucestershire, E. by Warwickshire, and W. by Herefordshire. The surface varies, the S. and S.W. being hilly, while through the centre run the river valleys with the Lickey and Clent hills in the N. The principal range is that of the Cotswold Hills in the S. with Bredon Hill, while the Malvern Hills in the S.W. reach a height of 1395 ft. in Worcester Beacon. The Severn is the chief river, with its tributaries the Teme, Stour, and Avon, forming the vales of Worcester (Severn), Teme and Evesham (Avon), the most fertile part of the county. It is well wooded and contains the two ancient forests of Wyre and Malvern Chase. The county is famous for its market gardens; and hops are also grown; almost the whole county is under cultivation, rather more than half being devoted to permanent pasture; wheat and oats are the main crops. Coal is mined and ironstone, limestone, and salt are also found. Droitwich and Stoke Prior are noted for their brine springs. Worcester is famous for the manufacture of porcelain dating from 1751; and Kidderminster for carpets, while in the N. are a group of towns, Dudley, Netherton, etc., included in the Black-

Country, where iron-work of all kinds are carried on. Other manufactures are needles and fish tackle, glass, and gloves at Worcester. Canals connect the Severn with other rivers and the railway service is good. Worcester is the county town, other important towns being Bewdley (2745), Droitwich (4146), Dudley (51,079), Evesham (8340), and Kidderminster (24,333). The county returns five members to parliament. The greater part of the county was at one time in the hands of the Church, and there were no less than thirteen great monastic foundations. Of these there are the ruins at Pershore and Evesham, both dating from the 8th century, Worcester Cathedral, and the priory church at Malvern also of the same date; and ruins at Halesowen, Bordesley, and Astley dating from the 13th century. The area is 427,487 acres. Pop. (1911) 526,087. See *Victoria County History—Worcester*.

Worde, Wynkyn (or Winkin) de, or Jan van Wynkyn, a printer, who came to England from Alsace-Lorraine, and helped Caxton from 1477, succeeding him at his printing office (1491). He lived in Fleet Street, London, from 1502, and died about 1535. He made improvements in the art of printing, especially in type-cutting, his works (over 400 in number) being distinguished by elegance and neatness. See E. G. Duff, *Printers, Stationers, and Bookbinders of Westminster and London, 1476-1535* (1906).

Wordsworth, Charles (1806-92), an English divine, nephew of the poet, educated at Harrow and Oxford. He was famous both as an athlete and a classical scholar. As tutor at Oxford he had Manning and Gladstone among his pupils. W. was second master at Winchester (1835-46), warden of Glenalmond Episcopal College (1846-54), and bishop of St. Andrews (1852). His works include *Public Appeals on Behalf of Christian Unity*, 1886; *Greek Primer*, 1839; *Shakespeare's Historical Plays*, 1883. See his *Annals of my Early Life*, 1806-46, 1891; *Annals of my Life*, 1847-56, 1893 (edited by Hodgson); *John Wordsworth, Episcopate of Charles Wordsworth*, 1899.

Wordsworth, Christopher (1774-1846), an English scholar and divine, youngest brother of the poet, educated at Winchester, becoming a fellow of ... master (1820-41). ... needs ... Essex ... and ... Sussex (1820). His works include: *Ecclesiastical Biography* (1810, 1839); *Christian Institutes*, 1836 (selections from English divines); *Who wrote*

Icon Basilike? 1824, and other works on its authorship, which called forth Todd's *Bishop Gauden, author of 'Εκὼν Βασίλει'*, 1829.

Wordsworth, Christopher (1807-85), an English divine and writer, youngest son of above, educated at Winchester and Cambridge. He was headmaster at Harrow (1836-44), canon of Westminster (1844), held a living in Berkshire (1850-60), and became bishop of Lincoln (1865). Among his works are: the Bible commentary, *Greek New Testament*, 1856-60; *Old Testament*, 1861-70; *Church History up to 451 A.D.*, 1881-83; *Memorials of William Wordsworth*, 1851; *Inscriptiones Pompeianae*, 1837; *Greece*, 1839 (new edition, 1858); *Theocritus*, 1844, 1877. In 1873-75 occurred his controversy with the Wesleyans, and 'the Great Coates case.' See *Life by J. H. Overton and E. Wordsworth* (1888).

Wordsworth, Dorothy (1771-1855), an English writer, only sister of the poet. From 1795 she kept house for her brother, accompanying him and Coleridge to Germany (1798-99). She later settled with Wordsworth and his wife at Grasmere, whence they moved to Rydal Mount (1813). The poet acknowledged in beautiful lines how much he owed to her inspiring companionship, and dedicated to her the *Evening Walk* (1792). Her *Recollections of a Tour in Scotland* (1803) were edited by Shalpe and her *Journals* by Knight (1897). She never fully recovered from an attack of brain fever (1832). A *Life of Dorothy Wordsworth* by Edmund Lee was published in 1886.

Wordsworth, William (1770-1850), a poet, was the son of John W., an attorney of Cockermouth, Cumberland, at which place the author was born. He was sent in 1778 to the grammar school at Hawkshead, and in 1787 went to St. John's College, Cambridge. In that year he published in the *European Magazine* his first poem. It was not until 1793, however, that he issued the *Evening Walk* and the *Descriptive Sketches*. Two years later he made the acquaintance of Coleridge, and the men, who recognised each other's genius, cemented a firm friendship; and through Coleridge he became acquainted with Charles Lamb and Hazlitt. In 1798 the friends published a joint volume of verse, styled *Lyrical Ballads*, which, however, attracted little or no attention, though Southey thought it worth an unfavorable review. In the same year W., with his sister Dorothy and Coleridge, went to Germany, and the brother and sister lived at Goslar, in the Harz district, and led a quiet uneventful life. They

returned to England the next year and settled at Grassmere, which was W.'s home till 1813, when he removed to Rydal Mount. He published various poems in 1807, and in 1814 printed *The Excursion*. *Peter Bell* and *The Waggoner* appeared five years later. About 1813 W. was given the sinecure of distributor of stamps for the county of Westmorland, which he held until 1842, when, on his retirement, he was granted a Civil List pension. In 1843 he accepted the poet-laureateship in succession to Southey, and his *Ode on the Installation of Prince Albert as Chancellor of the University of Cambridge* was one of the tasks done in his official position. Among his other works are: *Ecclesiastical Sketches*, 1822, and *Yarrow Revisited*, and other poems, 1835. *The Prelude, or Growth of a Poet's Mind*, was issued posthumously in 1850. His *Poetical and Prose Works*, together with Dorothy W.'s *Journals*, were edited by Professor Knight (1896). There are biographies by his nephew Christopher W., Bishop of Lincoln (1851), and by Knight (1889). W. is principally distinguished for his love of nature, and for the simplicity of his style. His leanings towards artificiality and his dread of being artificial on the expression of his feelings sometimes led him, however, into excesses. At his best, however, he had a magnificent gift of language, and the music of his verse is delicious. Beyond all cavil, he ranks with the great English poets.

Work, in mechanics and engineering, is the effect produced in any mass by a force acting against inertia or resistance. The effect may result in strain merely or produce motion of the mass; in all actual cases the whole W. possible is distributed, only a portion of it becoming *useful*, a great deal being expended in overcoming friction, or as, in the case of steam and electricity, 'leaking' owing to the impossibility of controlling the direction of the force. In mechanical W. a foot-pound is the unit. Thus if a body of 2 lb. weight changes its level by 5 ft., the W. given out in falling, or received on rising, is 10 foot-pounds, neglecting friction, etc. The W. is measured as the product of resistance and the distance over which it is overcome. This is so whether the motion is direct, inclined, or curved. If in the case of a force of p lbs. exerting a pull, the pull be not direct but inclined at an angle of θ to the resultant motion, the effective force is $p \cos \theta$. *Power* takes account of time; it is the time rate of doing W. One horse-power is the W. of 33,000 foot-pounds done in one minute. *Energy* is the capability of

doing W. It is useful to note that the energy of 1 lb. of coal being 12,000,000 foot-pounds, only about 4 per cent. is communicated to the shaft through the piston, 96 per cent. being lost. The very best steam engines use more than 1.5 lbs. of coal per hour for each horse-power given out; engines using Dowson gas consume similarly 1 lb. of coal; oil-engines, 0.9 lb. kerosene. The metric unit of W. is the kilogram-metre; in the C.G.S. system, the unit is the degree-centimetre or 1 *erg*. One joule (*g.r.*) = 10,000,000 *ergs* = 0.7373 foot-pounds; 1 *erg* = 13,563,000 *ergs* about. *Resilience* is the W. done on a bar in producing stress, or the W. the bar will do in regaining shape when relieved from stress. In the case of an *expanding gas*, when p = pressure and v = volume, $p = \frac{dW}{dv}$ when W is the work done. If expansion is according to the law $pv^s = c$, a constant, then $\frac{dW}{dv} = Cs - s$; $W = C \div v^{-s+1} \times C / -s+1$; $C = v_1^{s-1} \times p_1 / -s$, whence $W = (v_1^{-s} - v_2^{-s}) C / 1 - s$ is expansion from v_1 to v_2 .

Workhouse, see POOR LAWS.

Workington, a municipal bor., sea-port and market tn. of Cumberland, England, 34 m. from Carlisle, on the Derwent. Its industries include iron smelting, engineering, and shipbuilding. Pop. 25,092.

Works and Public Buildings, Board of, see BOARD.

Workshops Acts, see FACTORY AND WORKSHOP ACTS.

Workshop, a market tn. of Nottinghamshire, England, on the Ryton, 25 m. N.E. of Nottingham. Its parish church, which formerly belonged to an Augustinian priory, is a fine old cruciform edifice. The inhabitants are chiefly engaged in the making of malt, but there are also brass, iron, and chemical works. Pop. 17,914.

World, a weekly sixpenny paper, founded in 1874 by Edmund Yates and Grenville Murray. It was especially notable for the articles, criticisms, and gossip of Yates, the brilliant editorship of the late Mr. Labouchere, the unrivalled parliamentary sketches of Sir (then Mr.) H. W. Lucy, the piquant Parisian correspondence of Grenville Murray, and the powerful political articles of T. H. S. Eiseott.

Worm, see SCREW.

Worm Grass, or **Pink Root** (*Spigelia marilandica*). The roots have anthelmintic properties.

Worms, a city of Germany on the Rhine, in the grand-duchy of Hesse-Darmstadt, 9 m. from Mannheim. Its most notable building is the Romanesque cathedral of St. Peter and

Paul, dating from the 12th century, but there is also the church of Our Lady, a handsome Gothic edifice outside the town, finished in 1467, the church of St. Paul (1102-1116) which is now converted into a museum of antiquities, the Luther monument (1868) designed by Rietchel, the hospital, and the town hall. The Bischofshof, in which the German diets met, is now replaced by a modern edifice. The town is one of the oldest in the empire, and in the time of Ariovistus was a German chief's residence. It was fortified by Drusus in 14 B.C., and in the 5th century was the capital of the Burgundians. As early as 1074 it was a free imperial city, and is now a busy river port with important industries and trade. The manufs. include patent leather goods, machinery, wool, cloth, chicory, and slates, while many of the inhabitants are employed in the cultivation of the vine, the most famous wine being known as Liebfrauenmilch. W. is the scene of stirring events related in *Das Nibelungenlied*. Pop. (1910) 46,189.

Worms, see ENTOMOA, ANTHELMINTICS.

Wormwood (*Artemisia absinthium*), a tall perennial plant (order Compositae) with silky stems and leaves and numerous small yellow flower heads. It is one of the chief ingredients from which absinthe is derived, and is used as a tonic.

Wormum, Ralph Nicholson (1812-77), an English art critic, was for many years keeper of the National Gallery. He studied painting in Dresden, Rome, Florence, Paris, and Munich, and for a time was a portrait painter, but later became a writer and lecturer on art. He was appointed keeper of the National Gallery in 1854, and did much to develop and improve the Trafalgar Square Galleries. He wrote *Life of Holbein*; *The Epochs of Painting*; and *Analysis of Ornament*.

Worsborough, an urban dist. in the W. Riding of Yorkshire, England, 3 m. from Barnsley. It has extensive gunpowder mills, collieries, and steel works. Pop. (1911) 12,750.

Worsley, an urban dist. and manufacturing tn. of Lancashire, England, 6 m. from Manchester. It has cotton manufactures, ironworking, brick-making, and coal-mining. Pop. (1911) 13,906.

Worsted, see Wool.

Worth, a par. in Sussex, England, noted for its ancient church, said to be the only perfect ground plan of a Saxon church extant in England. Pop. (1911) 4343.

Wörth, a vil. of Alsace, Germany, on the Sauer, 11 m. from Weissenburg, famous as the scene of the battle

fought in 1870 between the Germans and the French, which resulted in a victory for the former under the Crown Prince of Prussia. Pop. 1216.

Worthing, a municipal bor. and seaside resort on the English Channel, Sussex, England, with a considerable mackerel fishery. In the vicinity is Broadwater Church, a fine example of mingled Saxon and Norman ornamental architecture. Pop. (1911) 30,305.

Wotton, Sir Henry (1568-1639), an English diplomatist and poet, born in Kent. He was secretary to the Earl of Essex during Elizabeth's reign, and under James I. was for twenty years in the diplomatic service. In 1624 he was made provost of Eton.

Wotton-under-Edge, a tn. of Gloucestershire, England, 12 m. from Stroud, with an endowed grammar school and a handsome church. Pop. (1911) 3021.

Wounds, the ruptures of the soft structures of the body. They are usually classified as incised, punctured, contused, and lacerated. An incised W. is a clean cut, such as is made by a knife. The blood-vessels being cut clean, they bleed more freely than other kinds. The opening tends to gape on account of the retraction of the superficial structures. When the wound is kept closed, the wound is usually pro-

cesses that is, the two surfaces soon become united by a film of lymph, which develops into connective tissue. Punctured Ws. are those produced by the thrust of a pointed instrument. They are dangerous according to their depth; a deep-seated organ may be injured or the instrument may have carried in septic germs. There is frequently little bleeding apparent, though there may be dangerous internal hemorrhage. Contused Ws. are caused by blunt instruments, or by falls. There is usually very little bleeding, though the parts may be extensively bruised. Owing to the injury to the small blood vessels, healing may be protracted. Lacerated Ws. are produced by injuries from machinery, the teeth and claws of animals, etc. They are dangerous when extensive, as there is considerable danger of infection by germs. Healing is usually by "second intention"; a film of lymph forms over the W. and granulations form. A scar ultimately takes the place of the destroyed skin. If tissue has been much destroyed, extensive sloughing may take place. In treating Ws. it is necessary first to arrest the bleeding and then close the W. Where there is danger of septic infection, however, the W. should be cleaned and dressed with antiseptics.

Wouverman, Philip (1620-68), a Dutch painter, was born at Haarlem. Having studied under his father, Paul Wouverman and John Wynante, he pursued his art in his native town with apparently little success, although his landscapes and hunting scenes are now very much appreciated for their breadth and animation of treatment.

Wrangel, Carl Gustav (1613-76), a famous Swedish soldier. He became a major-general of infantry at the age of twenty-four, and distinguished himself at the battles of Wolfenbüttel (1641) and Leipzig (1642). He commanded the Swedish fleet against the Danes in 1644-45, and in 1646 succeeded Forstenson as commander-in-chief of the Swedish army in Germany, playing a prominent part in the later stages of the Thirty Years' War. He subsequently became a member of the Council of Regency, but failed as an administrator.

Wrangel, Count Friedrich Heinrich Ernst (1784-1877), a German general, born at Stettin. He distinguished himself in the campaigns of 1807 and of 1813-14, and in 1848 commanded the federal forces of Schleswig-Holstein against the Danes, whom he defeated at Schleswig. In 1863-64 he again took the command in the war against Denmark. He was made a count in 1864.

Wrangel Land, New Columbia, or Long's Island, an island in the Arctic Ocean off the N.E. coast of Siberia. It was discovered by Long, although Wrangel made an expedition in search of it. It consists mainly of bare rocks which rise to a height of 2000 ft.

Wrangler, the term applied in the University of Cambridge, England, to the

first grade of students, i.e. the first grade of students in pure mathematics.

The one who took the first place in this grade was, until 1912, called *Senior Wrangler*. Those in the second grade are designated *Senior Optimes*, and those in the third *Junior Optimes*. The name is derived from the public disputations in which candidates for honours formerly participated.

Wrath, Cape, see CAPE WRATH.

Wraxall, Sir Nathaniel William, Bart. (1751-1831), a writer of memoirs, born in Bristol. His *Historical Memoirs of my own Time, from 1772-1784* (2 vols., 1815), are of importance for the sidelights they throw upon the history of the later Georgian period. The continuation (1784-90) was published in 1836. He also issued *Cursory Remarks Made in a Tour, 1775: Memoirs of the Valois Kings, 1771: History of France from Henry III. to Louis XIV.* (3 vols. 1795); and *Memoirs of the Courts of*

Berlin, Dresden, Warsaw, and Vienna (2 vols., 1799). He was M.P. for Hindon from 1780, and afterwards sat for Wallingford.

Wray, John, see RAY (OR WRAY), JOHN.

Wrecks. The law on W. is contained in the Merchant Shipping Act of 1894, so far as territorial waters are concerned. In earlier times flotsam, floating wreck; jetsam, property thrown overboard to avoid wreck; ligan, property sunk and marked with buoys for purposes of recovery; derelict, or totally abandoned property, were distinguished from wreckage cast on the shore, and were claimed by the Admiralty on behalf of the crown. These are all now included in the one general term. Receivers are appointed by the Board of Trade, which has taken over the powers of the Admiralty, and it is their business to take charge of any wreckage found or brought in, except in the case of that brought from extra-territorial waters by a foreign ship, unless requested by the owners or other interested party. It is the duty of all persons finding wreckage to notify the receiver, who must proceed to the place and take complete charge, not merely of property but of all means of recovery, including the work of persons near, vehicles, means of approach, and so on, as also of public order; he also must notify the nearest customs-house, and, if the value is over £20, Lloyds. In cases where the right to wreckage has been granted by the crown to lords of the manor, or other persons, they also must be notified. The duties of receiver, if he be absent, devolves on the chief customs officer, first; then on the chief officer of the coastguard, inland revenue officer, sheriff, justice of the peace, or officer of the navy or army on full pay. The wreckage being received, is finally sold, unless claimed within a year by the owner, the proceeds being paid over to the crown or other person having the right, after the salvage claims and expenses have been deducted. These also must be paid before recovery by the owner, if his claim has been established. In any case also, duty is levied on goods so recovered as if it had been imported naturally. The receiver's duties also extend to cases of ships in distress and any services rendered; he, or a wreck commissioner appointed by the Lord Chancellor, holds a court of inquiry. When W. occur in navigable water-ways or harbours, the authorities responsible for the safety of such places have power to remove them, and claim expenses from the owners or underwriters if they have entered into pos-

session. The term wreck applies only to tidal waters and to vessels and their contents; in the U.S.A. it applies also to inland lakes and the large rivers. In proportion as ships have become larger and have discarded sails, the number of W. has largely diminished; storm warnings have added to the safety of vessels largely. On the other hand, the value of W. is generally larger and salvage may be very remunerative; companies and firms have established themselves for the sole purpose of salvage. The employment of divers may be the means adopted to recover valuable property, or the ship may be bodily raised by ropes and chains

(1750), and another by Phillimore (1881).

Wrestling affords so obvious a means of trying the bodily strength and activity of men, that it has probably formed one of the athletic exercises of almost every nation, at least of every warlike nation. It was in use among the Greeks from the earliest times, and in Homer's *Iliad* (xxiii. 700ff) we have a fine description of an early contest. The Greek W. contest was divided into two parts: (1) the struggle to throw your opponent; (2) the struggle on the ground. At first the wrestlers wore a girdle, but in later times they wrestled naked. The body was previously rubbed with

oil to make the skin supple and to perspiration, and was then

ded with sand to give a grip.

The loser had to be thrown three times before he was vanquished. The Roman W. was an imitation of the later forms of Greek W. Neither of these must be confused with the modern Greco-Roman style, which is of comparatively recent invention. Throughout the middle ages, W. was a favourite sport in England among the common people, and the Londoners were distinguished for their skill (Matthew Paris, *Hist. Angl.* anno 1222). It has now almost died out except as a professional sport.

There are two distinct English games, however, which still continue in use, the rules of which are used in amateur contests. In the *Cornwall* or *Cornwall* and *Deron Game*, the wrestlers wear a short strong jacket, and the preliminary hold is made by a catch. Originally, heavy shoes were worn and the play often became very rough, though not so rough as in Lancashire. Two shoulders and one hip, or two hips and one shoulder must touch the ground before a wrestler is van-

quished. The *Cumberland* or *Cumberland* and *Westmorland* W. is the

cleanest and simplest of games, and is distinguished by the fact that there is no ground play. The preliminary hold is deliberate, each wrestler passing his left arm over the right shoulder of his opponent, the right arm under the left arm, and grasping the wrist behind the back. The wrestler who first touches the ground loses the match. The Japanese style of W., known as *Jiu-Jitsu*, does not bear the slightest resemblance to the types dealt with above. It is not a trial of strength, and it is not a sport. It is a method of self defence for long handed down secretly, and based on a very accurate knowledge of anatomy.

Wrexham, a parl. and municipal bor. and market tn. of Denbighshire, Wales, 202 m. from London. Its church of St. Giles, built about 1470,

be pumped out and rise. Another method adopted is to attach large iron cylinders, or calssons, which are sunk by means of water, and lift the W. when they are pumped out. Salvage operations have even extended to ancient W. of treasure ships. See Board of Trade, *Instructions as to Wreck and Salvage*; for salvage operations, *The Engineering Magazine* (Jan. 1900) and *Cassier's Magazine* (May and Aug. 1898).

Wrekin, see SHROPSHIRE.

Wren (*Troglodytes parvulus*), a common bird ranging throughout Europe, Northern Africa, and Asia. It is about 4 in. long and has short rounded wings, and usually carries its tail over the back. Its plumage is rich reddish brown, it builds a large domed nest, and additional nests are often built close at hand. Its song is remarkably loud. It feeds almost entirely on insects, and therefore deserves the protection which it has long shared with the robin. The gold crested W.

to the wren

Wren, Sir an architect. As a young man he was interested in anatomy and medicine, and was about thirty when he devoted himself seriously to the profession by which he became famous. After serving as assistant to Sir John Denham, he, in 1661, was appointed his successor; in 1669 as surveyor-general of works. The tale of his buildings is very lengthy and includes the chapels of Pembroke and Emmanuel Colleges, Cambridge, the Sheldonian Theatre, Oxford, and St. Paul's Cathedral, London. After the great fire of 1666, he was made surveyor-general and principal architect for rebuilding the whole city. He was a many-sided man, and his energy was prodigious. He is undoubtedly the greatest British architect of modern times. There is a biography by his son, Christopher

is 'one of the seven wonders of Wales.' There are breweries and tanneries. Pop. (1911) 60,677.

Wright, Joseph (1734-97), an artist, born in Derby. He studied in London under Hudson and in Italy, returning to Derby in 1797. Mainly a portrait painter, he acquired eminence by his representation of the effect of artificial light.

Wright, Thomas (1789-1875), a prison philanthropist, born at Manchester. He was by trade a foundry worker, but devoted his leisure time to the reclamation of discharged prisoners. He declined the post of government travelling inspector of prisons, thinking this would lessen his influence, but accepted a public testimonial, 1852, which enabled him to give up his work at the foundry and devote all his time to the ministration of criminals. He was a promoter of the reformatory at Blackley, and worked on behalf of the ragged schools of Manchester and Salford, and the Shoeblack Brigade.

Wright, Thomas (1810-77), an antiquary, born near Ludlow. Having written for various magazines, he established himself as a man of letters in London in 1836, and the following year was elected a fellow of the Society of Antiquaries. He was one of the founders of the Camden Society, 1838, and of the British Archaeological Association, 1843. Among his works are: *Biographia Britannica Literaria*, 2 vols., 1642-46; *Essays on the Literature, Popular Superstitions, and History of England in the Middle Ages* (2 vols.), 1846; *England under the House of Hanover* (2 vols.), 1848; *History of Ludlow*, 1852; *The Cell, the Roman, and the Saxon*, 1852; *History of Ireland* (3 vols.), 1854; *History of France* (3 vols.), 1856-62.

Wright, Wilbur (1867-1912), an aeronaut, born near Millville, Indiana. Being early interested in flying, he began to experiment with his brother about 1900, and three years later accomplished a flight of 260 yds., the first successful experiment of the kind with a motor-propelled aeroplane. In 1905 the two brothers made a record by flying 24½ m. at a speed of 38 m. an hour, and in 1908 Wilbur established his fame by a flight of 56 m. in France. He further increased his reputation by flying 77 m. the same year, being in the air for about 2½ hours. He visited Italy and England, 1909, and also set up a school at Pau, where he trained pupils, but his latter years were mainly spent in America.

Wriothesley, Henry, third Earl of Southampton (1573-1624), Shakespeare's patron, born near Midhurst. He studied at Cambridge, and at an early age became interested in litera-

ture, and from the time he joined the court (about 1590) became known as a patron of poets. To him Shakespeare dedicated his *Venus and Adonis* (1593) and his *Lucrece* (1594), and he was probably on terms of close intimacy with the famous poet. He was the favourite of Elizabeth and Essex, under whom he served in expeditions to Cadiz and Azores. He afterwards participated in Essex's conspiracy, and was imprisoned in the Tower, but was released by James I. (1603). He subsequently took command of a troop of English volunteers in the Netherlands, and died of fever at Bergen-op-Toom.

Wrist, or Carpus, that portion of the arm between the hand and the lower arm. The joint is made by the articulation of the ulna and radius with the carpal bones. The mobility of the joint is combined with a great degree of strength, so that dislocations and sprains are not so common as in, say, the ankle. Fracture of the lower end of the radius is known as Colles' fracture.

Writ: 1. In the literal sense of that which is written, W. is particularly applied to the Scriptures, or books of the O.T. and N.T., and again, in Scots' law, the term is sometimes used to denote a writing, deed, or any legal instrument. 2. In English law, a W. is a precept under seal in the name of some executive officer, such as the Lord Chancellor or a judge, having jurisdiction or authority in the particular matter, and directed to some public officer such as a county sheriff or to some private person, commanding him to do something in relation to a suit or action. In this sense a W. is a legal document which in effect is the first step in legal proceedings, civil or criminal (see SUMMONS). Some of the more important of the multifarious Ws. in English law are the W. to the county sheriff to elect a member of parliament, a W. of habeas corpus (q.v.), Ws. of mandamus (q.v.), prohibition (q.v.), and *quo warranto* (q.v.), Ws. of *subpœna ad testificandum*, and *subpœna duces tecum*.

Writer's Cramp, see CRAMP.

Writers to the Signet, see SIGNET, WRITERS TO THE.

Writing, the origin of the art of communicating ideas by significant and convenient symbols is generally traced to the Egyptian ideograms or hieroglyphics through the later hieratic characters (c. 2500 B.C.). But so vast is the period that must have elapsed from the time of the conventionalised pictograms of tangible objects or abstract ideas to the time when these actual or symbolical representations had become developed into their phonetic values, and again

to the time when they had gone beyond the alphabetic stage, that merely conjecture necessarily takes the place of definite statement in surmising the course of this long evolution (see *HIEROGLYPHICS*). From this it is clearly impossible to do more than conjecture the period when and where the art of even primitive pictographic W. was established; it is possible that the Egyptian hieroglyphics were derived from some primeval form of Chinese ideographs. However that may be, the excavations of Professor Flinders Petrie in the Egyptian royal tombs at Abydos to light inscriptions with phics assigned by Egyptologists 6000 B.C. But as Mr. Thompson points out (*Temple Dictionary*) there is evidence from clay tablets that *alphabetic* signs were then already in use; and if this evidence be reliable it is almost useless to attempt to assign anything approaching an exact date to the origin of the Egyptian W. Thompson (1903) states that a hieroglyphic inscription is that engraved on a tablet, now in the Ashmolean Museum at Oxford, erected to the memory of a priest who lived in the reign of Senn (4000 or 4700 B.C.). But as indicated above, Professor Petrie's discoveries are much older, while clay tablets found at Nippur seem to show that W. was practised in Babylonia as early as 5000 B.C. or even 6000 B.C. Whether the Babylonian cuneiform characters were a development of Egyptian hieroglyphics is doubtful, though the code of Hammurabi (2000 B.C.) does contain a few instances, which seem to suggest such evolution. The recovery of the ancient W. of Babylonia has ever been complicated by the fact that the W. of the earlier Babylonians, who invented the cuneiform script, was markedly different from the later script of both Nineveh and Babylon in the time of the Sargons and Nebuchadnezzar (600 B.C.). So far as the authenticity of much that is recorded in the O.T. is concerned, there can be no doubt that the most remarkable and suggestive discovery of modern times was that of the celebrated Tel el-Amarna tablets, comprising hundreds of letters in the cuneiform character, which were excavated from the mounds of Tel el-Amarna, the ruined site of the temporary capital of Egypt at the close of the XVIII. dynasty (c. 1300 B.C.). The philological value of these tablets is that they seem to prove that the language of Canaan was identical with the Hebrew; historically, their value is that they reveal to us the vastness

of the Semitic empire. They were written by kings and of Babylonia, Assyria, and Palestine, and other tributary monarchs of the Pharaohs, and lead to the inference that W. was perfectly developed and in ordinary use for all manner of transactions and among many people of different degrees of social rank. It is possible, too, from the obviously tremendous range of country in which the cuneiform script evidently prevailed, that this script is the source whence the Phœnician or Canaan W. was developed. Each character in cuneiform

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widely different sounds, and many in which the same sound was represented by different characters, all of which features greatly augmented the difficulty of decipherment. The grammatical forms show that the later Babylonian-Assyrian tongue was Semitic. How long this cuneiform script of the Babylonians endured in Canaan is undecided, though some maintain that it did not cease to be the prevalent form of W. till the time of Hezekiah (700 B.C.). The modern European alphabet is derived directly from the Roman, the latter in its turn from a localised form of the Greek alphabet, while for years it has been almost axiomatic that the Greek alphabet was derived from the Phœnician (see *PHœNICIA*), though the origin of the Phœnician or old Semitic alphabet has not been satisfactorily settled. Some derive the Phœnician or Canaan W. from the Assyrian or Babylonian cuneiform script, others variously from the hieratic W. of the Egyptians and the Hittite characters. The Hittite W. was related to the Vannic (or proto-Armenian) cuneiform script and was in all probability of Caucasian origin. The fact that three of the supposed sources of Phœnician are cuneiform scripts of nations, each of which in its turn conquered or drove the Phœnicians to the narrow strand of the P. Mediterranean, makes it probable that their W. was originally cuneiform, and such resemblance as it bears to the hieratic W. of the Egyptians strongly suggests that the latter was the source of all the cuneiform scripts. If this be so—and weight is lent to the theory by reason of the semi-hieroglyphic nature of the Old Babylonian cuneiform W.—the progression from old Egyptian hieroglyphics to late Assyrian cuneiform W. through hieratic and old Babylonian W. may be considered as established.

The Hebrews or Israelites borrowed the Phœnician W. when they settled in Canaan. The earliest notable extant record of Hebrew alphabetic W. is that on the Moabite stone discovered at Dibon, 25 m. E. of the Dead Sea, in 1868, and now in the Louvre. It commemorates the victory of Mesha, King of Moab, over Jehoram, King of Israel, and the Edomites, and is believed to belong to 890 B.C. The Siloam inscription, discovered in the wall of the tunnel connecting the Virgin's Fountain with the Pool of Siloam (*Temple Dictionary of the Bible*) is also in the more developed cursive style. In 1908 Mr. R. A. S. Macalister discovered a calendar inscription in excavations at Gezer, written in the same type as the Siloam and Moabite inscriptions. From these and the rolls of Aramaic papyri discovered in 1904 at Assouan, philologists have been able to construct the whole primitive Phœnician alphabet of twenty-two letters, albeit in a form which had evidently gone through numerous stages of change. Coming to Greek and Latin W., the most inexpert will readily note the closest affinities between the Greek Cadmean and local Greek alphabets, and the Pelasgian and Latin alphabets on the one hand, and on the other, the Egyptian hieratic and hieroglyphic alphabets. The Greeks, as noted above, are reputed to have learned the art of W. from the Phœnicians, and the period commonly assigned to this event is variously the 9th, 8th, or 7th century B.C., while, according to the Cadmean myths, Boetia was the birthplace of the Greek alphabet. Like the Semitic W., the earliest Greek W. was always from right to left, a style which was later followed by that called *boustrophedon*, alternately from right to left and from left to right, as the ox draws the plough (*Temple Dictionary*). The earliest extant Greek inscriptions appear to be those incised on the huge figure of Ramesses II. at Abu Simbel on the Nile by Greek mercenaries of the Egyptian army (c. 600 B.C.). Paleographers have long ago learnt from papyri that the ancient Greeks throughout all known periods as far back as tradition goes employed two kinds of W., the *Literary* or *Bookhand* for works of literature, and the *cursive* for transactions of every-day life.

There is little need in this article to trace the early history or follow out the development of Latin W. The earliest Latin W. was, as noted above, borrowed directly from local Greek, and the most inexpert can readily see the faithful resemblance of the Latin characters of the present day to those of the Pompeian wall inscriptions, or

the Dacian waxen-tablets of the 1st and 2nd centuries A.D. The most ancient forms of Latin literary W. are: (a) The square and Rustic capitals, and (b) uncials; then later come mingled hands of uncial and minuscule letters, and half-uncial W. W. in square capitals was neat and bears the closest possible resemblance to the familiar printed capitals of to-day, but there was no distinction drawn between N and U. The only extant specimens appear to be a few leaves of the MSS. of Virgil (4th century A.D.). W. in Rustic capitals was more straggling in appearance, but when employed for choice literary works the characters appear to have been formed with great care. The earliest of all Latin MSS. were written in Rustic and on vellum. Instances are a poem on the battle of Actium, discovered among the papyrus fragments of Herculaneum, palimpsest fragments of Cicero's orations in the Vatican Library, the Codex Romanus, and the Codex Palatinus of Virgil, the Codex Bezae of Terence, and a finely executed MS. of the poems of Prudentius in the National Library at Paris, while in the British Museum some of the Cottonian MSS. are written in a style which imitates the Rustic W. The Roman cursive writing, i.e. old Roman letters written at greater speed than the formal capitals or uncials, formed the common or unofficial style of W. of practically all the Latin or Roman peoples of the first three centuries of the Christian era, or rather of such of them as could write at all. The charcoal and chalk wall inscriptions, discovered in the ruins of Pompeii and Herculaneum (according to Zangemeister's *Corpus Inscriptionum Latinarum* in the Berlin Academy) in this hand, show that it was used for poetical quotations, pasquinades, satirical remarks, love epistles, salutations, idle words, etc. (see ch. xv. of Thompson's *Palaeog.*). These examples, however, are little better than rough scrawls, and one must turn to the more scholarly and finely executed Ws. traced with a stylus on smooth waxen tablet surfaces for the best examples of the Roman cursive hand. It is not easy to trace the later development of this hand, however, as paleographers are confronted with a complete dearth of records for some centuries, and when this hand re-appears it has degenerated into a large straggling hand almost utterly illegible, except by a few of the most expert readers.

Materials Used.—Rock and stone were, no doubt, the earliest materials for the reception of W., one world-famous specimen being the Rosetta

Stone (*see under* HIEROGLYPHICS). In Babylonia and Assyria clay tablets were used, and cuneiform characters appear, too, on vases, bricks, and cylinders of the same mineral. Wooden tablets, tiles, potsherds, and shells were used, especially in Egypt, Greece, and Palestine, before the time of papyrus and parchment, while the Persians, Assyrians, and Egyptians also made use of linen and leather. But practically all the masterpieces or important records of ancient literature that have come down to us were written on papyrus, the remarkable preservative qualities of the sands of Egypt and the air-tight properties of the tombs and catacombs of that Sindhbad's vale of antique treasures having saved numerous documents from the decay of time. Parchment or vellum (prepared from the skins of sheep, calves, goats, asses, or antelopes), from its greater durability and the fact that it was much more easily obtainable than the reed from which papyrus was made, ultimately supplanted papyrus for all literary purposes, though bibles of the 4th century are found written on papyrus rolls as well as in parchment codices (*see* MANUSCRIPTS) or books.

Greek Bond, in the MSS. graphy.
cal Society, ed. by E. A. Bond, E. M. Thompson, and G. F. Warner; Tynlor, *The Alphabet*, 1883; Waftenbach, *Das Schriftwesen im Mittelalter*, 1875; and Silvestre, *Universal Palæography*.

Wroxeter, a par. of Shropshire, 6 m. from Shrewsbury, containing remains of the Roman station *Uriconium* or *Viroconium*. Pop. about 600.

Wuchang, a departmental tn. of Chinn on the Yangtse-Kiang, capital of the province of Hu-peh. It is almost opposite Hankow, and is the port and customs centre for the whole Hankow district. Pop. about 7500.

Wuchow, a treaty port of China, on the Si-kiang, in the province of Kwang-si. It is the distributing centre between Canton, Kwang-si, and Kwei-chow, and exports sugar, various oils, hides, and nutseed, the chief imports being cotton and cotton goods, woollens, and kerosene oil. Pop. about 65,000.

Wuhu, a treaty port of China, in the prov. of Ngan-hui, on an affluent of the Yangtse-Kiang. It has considerable foreign trade, exporting rice, cotton, wheat, tea, furs, and feathers, and importing opium, matches, glass, and sandalwood. It is also a manufacturing town, and is noted for its

red cord, cutlery, and steel articles. Pop. about 137,000.

Wullenwever, Jürgen (c. 1497-1557), a burgomaster of Lübeck, was the leader of the democratic party in that town, and exerted himself to restore the ancient prosperity of the Hanseatic League. In this end he was for a time partially successful, but the Diet of Speier vetoed all his reforms, and in October 1535 he was delivered into the hands of Duke Henry of Brunswick, who put him to death after a long-protracted trial in which torture was freely employed to extract a confession.

Wulstan, or Wulfstan, and sometimes Wolstan: 1. A monk of Winchester in the 9th century, author of a poem, in Latin hexameters, on the Miracles of St. Swithun, which is reputed the best Latin poem of that age produced in England. 2. An Archbishop of York, in 1003, author of two pastoral letters and several sermons in Anglo-Saxon, the most remarkable of which is printed in Hickes's *Thesaurus*.

Wupper, a riv. of Prussia, trib. of the Rhine. It rises in the Sauerland, winds N.W., then S.W., flowing past Barmen and Elberfeld, and finally enters the Rhine between Cologne and Düsseldorf. It has a course of 63 m., but is not navigable.

Württemberg, a kingdom in the S.W. of Germany, bounded by Bavaria, Baden, and the Lake of Constance. It has an area of 7494 sq. m., and almost entirely surrounds the two principalities of Hohenzollern. For the most part it is mountainous, the chief mountain ranges being the Swabian Alps on the E. and the Schwarzwald which runs from S. to N. along the W. border, gradually sloping towards the centre of the kingdom. The chief rivers are the Neckar and the Danube, into which almost all the other rivers discharge themselves. W. is one of the most fruitful countries of Germany, and agriculture is on the whole carried on upon a good system. The metals and minerals produced are copper, lead, zinc, iron, marble, mill-stone-grit, freestone, quartz, precious stones, porcelain, earth salt, coal, etc. The manufactures include linen and woollen cloths, silks, hosiery, carpets, leather, porcelain, earthenware, iron and steel goods. There is also a considerable trade in the national produce of the country. Pop. 2,457,574.

Würzburg, the cap. of the Bavarian circle of Lower Main, situated in a beautiful valley on the Main. It has been the seat of a bishop since 741, and round it an episcopal principality gradually took shape. It has numer-

rous fine churches and a famous episcopal palace. The district produces much wine and fruit. Pop. 82,114.

Würzen, a tn. in the kingdom of Saxony, Germany, 15½ m. from Leipzig. It has a 12th century cathedral, and manufactures of beer, machinery, carpets, furniture, cigars, leather, and paper. Pop. 17,618.

Wusung: 1. A tn. of China, in the prov. of Kiangsu, 11 m. from Shanghai, at the mouth of the Wusung R. A pioneer railway was opened between Wusung and Shanghai in 1875, but being built without any regular permission from the Chinese government, was ultimately destroyed. 2. A river of China, which rises in Lake Sutai, from which it issues as the Futhang-ho. After this it has an eastern course, and takes the name of Hwangphu, and finally flows N. past Shanghai and enters the Yangtse-kiang just below the town of Wusung.

Wyandots, a formerly large tribe of N. American Indians, known also as Hurons. They were discovered on the E. shore of Lake Huron by the first French explorers, with whom, notably with Champlain, they speedily formed an alliance. They were the traditional foes of the Sioux (q.v.), and in their dealings with whites were always ready to side against the English settlers in America. Very few pure-blooded Wyandots remain, the most numerous colony being that of the village of Jeune-Lorette, near Quebec, where there are about 300 cultivators.

Wyandotte, a city in Wayne co., Michigan, U.S.A., on Detroit R., with manufactures of alkali, rugs and furs, soda, and starch. There are also salt works and shipbuilding works. Pop. (1910) 8257.

Wyandotte Cave, a natural formation in Crawford co., Indiana, U.S.A., containing a greater number and variety of stalactites and stalagmites than any other cave in the U.S.A.

Wyatt, Sir Matthew Digby (1820-77), an English architect and writer, born at Devizes. In 1836 he won the essay prize of the Institute of British Architects. Studied abroad (1851); appointed secretary to Great Exhibition Committee. Designed interior of the India Office; appointed Slade professor at Cambridge, 1861. Designed many important London buildings.

Wyatt, Sir Thomas (1503-42), a courtier and poet, born at Allington Castle in Kent. He was one of the most accomplished men of his day and was held in high favour at court. He was frequently employed by the king in positions of trust: he went as ambassador to Charles V. of Spain, and after having received a grant of lands at Lambeth in 1542, he was

named high steward of the king's manor at Maidstone in 1543. His poems were published with Surrey's in London (1557), and some of them are remarkable for their grace and elegance. His satires, too, are worthy of mention; but he is chiefly remembered as the pioneer of the English sonnet. His son, Sir Thomas Wyatt, saw service at the siege of Landrecies (1544), and ten years later led the Kentish men to Southwark, when the Spanish match was in agitation. He was captured and executed.

Wyborg, see VIBORG.

Wycherley, William (c. 1640-1716), a dramatist. His first play, *Love in a Wood*, produced in 1671, was published with a dedication to the Duchess of Cleveland, whose lover the author became. This was followed by other comedies, *The Gentleman Dancing-Master*, *The Country Wife*, and *The Plain Dealer*. W.'s plays are all of them ingeniously constructed, the situations are amusing, and the dialogue witty and sparkling, but they are marred by the flagrant indecency that damns all the Restoration dramatists. The best collected edition of W.'s works is that by W. C. Ward (1893), which is printed in the *Mermaid Series of Old Dramatists*.

Wycliffe (spelt also Wyclif, Wiclif, Wickliffe, and in many other ways), John (d. 1384), an English scholar and reformer, is supposed to have been born about 1324 in the par. of Wycliffe near Richmond, in Yorkshire. He entered Queen's College at Oxford about 1840, but soon removed to Merton. Later he became master of Balliol, and it is in this position that the first definitely historical mention of him is found. At that time a contest was raging between the secular clergy and the Mendicant Orders, whose hold on the University was rapidly increasing. W. wrote vigorously, but unsuccessfully against the Mendicants. In 1365 he resigned the mastership of Balliol for that of Canterbury Hall, then recently founded by Archbishop Islip, and in 1368 he exchanged his living of Fillingham for that of Lutterworth, in the archdeaconry of Buckinghamshire. About 1375 he was presented by the king to the rectory of Lutterworth in Leicestershire. He was already well known throughout the country, though it is gradually becoming clearer that his controversy was more academic than popular, and that the scholastic world of Oxford was the centre of his activities and the chief audience to which he spoke. He had long been speaking very freely about the relations of the civil and spiritual powers, when in 1378 the Papal schism caused him to direct his in-

quiries still deeper. He was vigorously supported by John of Gaunt, Duke of Lancaster, but his doctrines and teachings were unequivocally condemned by the clergy. The Convocation of his university declared his doctrines heretical, and the archbishop of Canterbury did the same. Many of his followers were tried, and almost all recanted. He spent his latter years at Lutterworth, where his pen was as active as ever. He died in consequence of a paralytic stroke. W.'s influence in England was once considerably over-estimated. It was far less here than in Bohemia, where John Huss took up all his ideas. Consult *England in the Age of Wycliffe*, by G. M. Trevelyan.

Wycombe, Chipping, or High, a municipal bor. and market tn., Bucks, England, 34 m. from London. The church of All Saints dates from the 13th century. Chair-making is the leading industry. Pop. (1911) 24,557.

Wye: 1. A river of Wales, which rises in Plinlimmon, and after a course of 130 m. enters the Severn 2½ m. from Chepstow. It has valuable salmon fishery, and is noted in Herefordshire for its beauty. 2. A tn. in Kent, 4 m. from Ashford. It has the South Eastern Agricultural College and a church rebuilt by Archbishop Kempe in the time of Henry VI. Pop. (1911) 1411.

Wykeham, William of (1324-1401), took deacon's orders at an early age, but was not ordained priest until 1362. In 1364 he became keeper of the privy seal; in 1366 he was elected Bishop of Winchester, and in 1367 he became Lord High Chancellor of England, holding office till 1371. Winchester College and New College, Oxford, were founded by him, the former being finished in 1394 and the latter in 1386; he also rebuilt Winchester.

Proceedings against him were abandoned, and his temporalities were restored.

Wymondham, a market tn. of Norfolk, England, 0 m. from Norwich. The church comprises part of the priory founded at W. in 1107, and there is also an interesting old market cross. The industries include brewing and brush making. Pop. 4746.

Wynad, or Wainad, a table-land of the Western Ghats, British India, about 60 m. by 30 m. It has valuable forest preserves, and produces coffee, tea, pepper, and cardamoms. It is also noted for its gold mines.

Wynants, or Wijaants, Jan (c. 1615-79), one of the founders of the great Dutch school of landscape painting, born at Haarlem. Little is known of his life, but he acquired great fame

by his rendering of natural phenomena, though he was less successful with the human figures and animals, generally inserted by other artists.

Wynberg, a suburb of Cape Town, South Africa, 146 ft. above the sea, on the railway to Kimberley. White pop. (1911) 7886.

Wyndham, George (1863-1913), an English politician, born in London, and received his education at Eton and Sandhurst. For a short time he served in the Coldstream Guards, and saw service at Suakin in 1885. He resigned in order to enter political life, and in 1898 became Under-Secretary for War. In 1900 he was made Chief Secretary for Ireland, and two years later entered the Cabinet. He represented Dover in the Conservative interest from 1889 till his death.

Wyakyn de Worde, see WORME.

WYNKYN DE.

Wyntoun, Andrew of, a Scottish chronicler, was prior of the monastery of St. Serf on Lochleven. He wrote *The Orygynale Cronykil of Scotland*, a work in nine books or cantos, the last four of which are devoted to Scottish history. In style the work resembles Barbour's, and it is of some importance historically.

Wyoming, a central west state of the U.S.A. Bounded by Montana on the N.E., Dakota and Nebraska on the E., Colorado and Utah on the S. Area 97,914 sq. m., 320 m. being water surface. Forms part of the Great Plains region. Bighorn Mts. are noted for curious hog-back ridges. The Rockies invade the S. of the state. Gannett Peak, highest point of Wind River Range, is 13,775 ft. Yellowstone Park is situated in this state, and is noted for its marvellous scenery and geysers. Yellowstone, Bighorn, and Powder rivers flow E.; Snake R. rises in the N. It has great mineral wealth: coalfields, silver, gold, and valuable copper mines. Natural gas is also found. There is a large irrigated area, much desert land being thereby rendered fertile. There is a state university at Laramie. Principal cities: Cheyenne, Laramie, and Rock Springs. W. was first settled in the 17th century by Spaniards. John Cotter discovered Yellowstone Park in 1807. In early days there was much fighting with the warlike Indian tribes. There was a great rush of emigrants on discovery of gold in the early seventies. It was only admitted to the Union in 1890. Pop. (1910) 145,965.

Wyoming Valley, a crescent-shaped valley in Luzerne co., Pa., U.S.A., with rich deposits of anthracite coal; noted for its scenery. The massacre of Wyoming, the subject of Campbell's poem, took place here (1778).

X

X to an Englishman is the representative of what might as well be denoted by the two consonants *ks*. But in the Greek alphabet it was merely a guttural aspirate, equivalent probably to the German *ch*. The letter X was the last in the Roman alphabet, neither Y nor Z belonging to it. The words in which those two letters occur are not really part of the Latin language but borrowed from the Greek, as *zephyrus*, *zona*; or from some Eastern source, as *gaza*. Such forms as *lachryma*, *hiems*, *sylva*, are errors of modern editors. The Romans themselves wrote *lacruma* or *lacrima*, *hiems* or rather *hiemps*, and *silva*. The interchanges of x with other letters are as follows: (1) x with c, as in the double form of the Latin or Greek preposition *ex* or *ec*; (2) x with *se* or *sk*; (3) x with *g*, as in Latin *augeo* compared with the Greek *αυγαω*; and *μυγμα* compared with *miz*, English, and *miz-lus*, Latin; (4) x with *ps*, as the Latin *exilis* compared with the Greek *ψιλος*.

Xanthi, a tn. in the vilayet of Adrianople, Turkey, with important tobacco industries. Pop. 14,000.

Xanthine (2, 6, dioxypurine), $C_4H_4N_4O_2$, a uric acid or purine derivative, is a white powder, slightly soluble in water. It occurs in the blood, in urine, and in tea.

Xanthippe, the wife of Socrates. Though she possessed many fine domestic virtues, she was notorious for her bad temper.

Xanthippus, an Athenian general, the father of Pericles. He was ostracised in 484 B.C., but returned to Greece at the time of Xerxes' invasion and succeeded Themistocles as commander of the fleet (479). He won a great victory against the Persians at Mycale (479).

Xanthoxylum, or Zanthoxylum, a genus of aromatic shrubs and trees (order Rutaceae). *X. fraxineum*, the toothache tree, gives relief in toothache and rheumatism.

Xanthus, the most famous city of Lycia, stood on the W. bank of the river of the same name. Twice in the course of its history it sustained sieges, which terminated in the self-destruction of the inhabitants with their property, first against the Persians under Harpagus, and long afterwards against the Romans under Brutus. The city was never restored after its destruction on the latter occasion. X. was rich in temples and

tombs, and other monuments of a most interesting character, and several important remains of its works of art are now exhibited in the British Museum.

Xavier, Francis, Saint (1506-52), a Spanish Jesuit missionary, 'the Apostle of the Indies,' born at the castle of Xaviero, near Sanguesa, in Navarre. At the University of Paris he met Ignatius Loyola, with whom he was associated in the formation of the Society of Jesus (1534). He took holy orders in 1537, and for some years preached in Rome. In 1541 he sailed for the E. Indies as a missionary. After having made numerous converts in Goa, Malacca, Travancore, the Banda Isles, the Moluccas, and Ceylon, he founded a mission in Japan (1549-51), but was forbidden to enter China. He died at San-chian, near Canton. His *Letters* were published in 1631. See *Life* by Mary McClean (1896).

Xebec, a small, swift-sailing vessel with square or lateen sails, formerly much used by the Algerine pirates of the Mediterranean. It carried three masts and lay very low in the water.

Xenia, cap. of Green co., Ohio, U.S.A., the seat of Wilberforce University. Pop. (1910) 8706.

Xenocrates (396-314 B.C.), a famous Greek philosopher, born at Chalcædon. He was a disciple of Plato, and succeeded Speusippus as head of the Platonic Academy at Athens (339-314). In his system of philosophy he modified the Platonic teaching by introducing Pythagorean doctrines of numbers.

Xenon (Xe, 128), the heaviest of the Argon group of inert gases, was obtained by Sir W. Ramsay by the fractional distillation of liquid air. It is present in the atmosphere to the extent of one part in twenty million. The spectrum of X. shows prominent red and blue lines in the intermittent discharge, but with the 'jar' discharge green lines take the place of the red and blue.

Xenophanes (fl. 510-480 B.C.), a Greek philosopher and poet, the founder of the Eleatic school of philosophy. He was born at Colophon in Ionia, but settled for some time in Elea, S. Italy, where he wrote several elegiac poems, and a poem on nature in hexameters, of which fragments remain. See Bergk's *Lyrici Græci*, ed. 1900.

Xenophon (c. 435-354 B.C.), a Greek

historian and Athenian general, was the son of Gryllus, and a friend and disciple of Socrates, who is said to have saved his life at the battle of Delium (424). In 401 X. entered the service of the Persian prince, Cyrus the Younger, who was waging war against his sc

Artaxerxes officers were

the battle of Cunaxa, and X., with

expedition is given in his *Anabasis*. He entered his soldiers into the service of Lacedæmon. In 399 X. was banished from his home, either on account of his Spartan sympathies, or because of his friendship with Socrates, who was put to death in that year. In 396 he joined the Spartan army, and fought under King Agesilans at Coroncia (394). He was rewarded with an estate at Scillus, where he settled with his wife Philesia. After the renewal of an alliance between Athens and Sparta (371), the decree of banishment against X. was repealed, and he is said to have lived the rest of his life at Corinth. Besides the *Anabasis*, he wrote a life of Agesilans; *Hellenica*, a history of Greece from 411 to 362; *Memorabilia*, *Apology*, *Economicus*, and *Symposium*, all of which are expositions of the teaching of Socrates; *Hiero*, a dialogue on tyranny; *Cyropædia*, a political romance; *On Horsemanship*; *Hipparchicus*, on the responsibilities and powers of a cavalry officer; *Cynegeticus*, on hunting; *The Lacedæmonian Constitution*; and *The Athenian Revenues*. There have been many English translations of his best known works.

For text, see

chant (Clarendon Press, 1900). Also consult J. B. Bury's *Ancient Greek Historians*, 1909.

Xenotime, or Phosphate of Yttria, a mineral which crystallises in the tetragonal system, and is found at Ytterby in Sweden.

Xeres, see JERÉZ DE LA FRONTERA.

Xerxes, King of Persia (485-465 B.C.), born about 519 B.C., was the son of Darius the Great.

and with this end in view he organised a vast army, which he led across the Hellespont by means of a bridge of boats (480). Another great feat of his was the construction of a canal through Mt. Athos. He marched southwards without meeting resistance until he reached Thermopylae, where he defeated Leonidas and his handful of Spartans. He burnt

Athens to the ground, but met with a slight naval disaster at Artemisium, and was severely defeated at Salamis (480). He retreated to Asia, and was assassinated by Artabannus.

Ximenes (or Jimenes) de Cisneros, Francisco (1436-1517), a Spanish cardinal and statesman, born at Torre-

in Castile. He studied at

de Henares, Salamanca, and

Rome, and receiving a papal letter of nomination, took possession of the archpriesthood of Uceda, for which he was imprisoned by the archbishop of Toledo for six years. In 1480 he was appointed grand-vicar of Sigüenza to Cardinal Mendoza. Two years later X. took the Franciscan vows, and became confessor to Queen Isabella in 1492. The queen appointed him archbishop of Toledo in 1495, and on her death he was appointed regent (1506) to the mad Queen Joanna. He founded the University of Alcalá de Henares (c. 1498), organised the preparation of a new Polyglot Bible, called the Complutensium (1502-17), and did his utmost to reform monastic life. In 1507 he became a cardinal, and in 1509 led in person an expedition against Oran in Africa. On the death of Ferdinand he again acted as regent (1516-17), and died at Bou on his way to welcome the new king, Charles. See Gomez de Castro's *De Rebus Gestis Francisci Ximenii* (1569), and Lives by Barrett (1813) and Ulrich (1883).

Xisnthros, see DELUGE.

Xochimilco, a tn. of Mexico, 12 m. S.S.E. of the capital, with Aztec remains. Pop. 11,000.

X-Rays, see VACUUM TUBES.

X-Rays in Medicine and Surgery.

The properties of X-rays as regards their action by different substances, and their early period in the study of the phenomenon, applied to dis-

covering the condition of the underlying structures of the body. Thus an X-ray photograph may disclose a fracture, a dislocation, a foreign body such as a bullet, a tumour, calculus, etc. The opacity of bismuth salts to the rays has led to their utilisation in certain disorders of the alimentary canal. Thus, if a dose of bismuth be administered, the substance can be followed on its course through the digestive tract and the existence of any obstruction demonstrated. The action of the rays on certain tissues has led to many therapeutical applications. Originating in injuries to X-ray workers, research on these lines has now demonstrated the possibility of destroying morbid elements in the tissues by a measured administration of the rays. An important adjunct to the practice is the contrivance known as Sabouraud's pas-

tiles. These consist of platino-cyanide of barium, which changes colour when a certain 'dose' of X-rays has been administered. In this way such conditions as rodent ulcer, ringworm, strumous glands in the neck, uterine fibroids, and other growths are cured or ameliorated.

Xylol, the commercial name given to xylene, which is obtained from coal-tar. Xylene, or dimethyl-benzene, $C_6H_4(CH_3)_2$, exists in ortho-, meta-, and para-modifications, and the three are similar in physical properties (boiling point 138° - 143° C.).

Xyloidine, an explosive like gun-cotton, which is prepared by the action of nitric acid on starch or woody fibre.

Xylonite, *see* CELLULOID.

Xylophagidæ, a family of flies which suck the juices of plants and the sap of trees.

X Y Z Correspondence. President Adams of the U.S.A. used this term in the Congress reports for the letters of Marshall, Pinckney, and Gerry, who were ambassadors to Talleyrand in France.

Y

Y has found its way into the alphabets of W. Europe through the later Latin alphabet. The sound of *y*, so familiar to the English at the beginning of words, as in *yes*, *young*, *yoke*, was represented in Latin by a mere *i*, which, however, when so used, received from the grammarians the distinctive name of *i consonans*. Our modern editors have for the most part substituted for it a *j*. Thus, *iugum*, or rather *iugvat*, which is now written *jugum*, commenced with a sound which is commonly held to have been the same with our initial *y* in *yoke*. The English have a habit of expressing the sound, though they do not write the letter, whenever a long *u* begins a word, as *union*, *unity*, *useful*: so that those who write *an useful contrivance* insert a letter at the end of the first word which no one would pronounce. In Anglo-Saxon the sound of a *y* was commonly represented by an *e* before *a* or *o*, and by an *i* before *e* or *u*, in which cases the allied languages of Iceland, Denmark, and Sweden for the most part employ a *j*.

Yablonoi, or Yablonovoi, a range of mountains in S.E. Siberia, between Transbaikalia and the Stanovoi Mts., nearly 1000 m. in length. Mt. Sokhondo (8050 ft.) is the highest peak.

Yacht, a steam or sailing vessel used for pleasure or racing. From early times men of exceptional wealth have fitted up vessels for their personal use, and gradually there have evolved types of sailing vessels and of steamships of small or moderate size, furnished with gear to a certain degree of luxuriousness compatible with efficient handling, and capable of more than average speed. In the case of sailing Ys., the various structures adopted have been determined by the exigencies of the rules controlling racing. Before the 19th cen-

tury vessels of different tonnage and varying rigs raced without systematic handicapping, but as Y. clubs became formed for the purpose of promoting racing, the tendency towards building ships with a direct view to racing led to the establishment of rules for determining handicaps. The most prominent of British yachting clubs started as the Yacht Club in 1812, became the Royal Yacht Club in 1820, and has been styled the Royal Yacht Squadron since 1833. In 1875 the Yacht Racing Association was established to govern the conditions of racing. The original method of handicapping was based on tonnage only, a quantity arrived at by multiplying the length by the square of the breadth. It was found that this condition favoured the building of long narrow vessels with heavy keels. These vessels, however, were not very successful in racing foreign Ys. when the British style of handicapping was not adopted. A new rule in 1887 determined the rating by the factors of length and sail area. The length being measured at the water-line, designers now aimed at building a dish-shaped vessel with a large amount of overhang at stem and stern, and rendered stable by a heavy keel, which developed later into a long fin weighted at the extremity with a heavy mass of lead. Later rules have brought more factors into the rating, and the present international rule, accepted by all important countries except the U.S.A., arrives at the rating by dividing by 2 the length + breadth + $\frac{1}{2}$ girth + 3 times the difference between the maximum chain girth and the real girth + $\frac{1}{4}$ of the square root of the sail area - freeboard. In racing, Ys. are given a time-allowance for every metre of their rating according to class, and this allowance is adjusted to its actual time, all Ys.

mous size. Ys. are sometimes grown in Britain, chiefly for the ornamental value of the twining branches and white or yellow flowers.

Yama, in Hindu mythology, the judge and ruler of the departed. He is represented of a green colour, with red garments, crowned, four-armed, and sitting on a buffalo. He holds a club and noose, with which the soul is drawn from the deceased's body. Y. had a twin sister, Yami, and the two were thought to represent the first human pair.

Yamagata, a tn. of Japan, 170 m. N.E. of Tokyo. Pop. 42,234.

Yanaon, a small piece of French territory in Madras, India. Area 5 sq. m. Pop. 5000.

Yanbu, or Yembo, a port of Arabia, on the Red Sea. Pop. 5000.

Yang-tse-kiang, the greatest river of China. Its source is in the Tang-la Mts. of the Kuen-lun system in Central Tibet. It originates in a number of dashing torrents which are more than 16,000 ft. above the sea-level. Under the name of the Kin-sha-kiang, it flows in an easterly direction through the prov. of Yunnan, and turning northwards forms part of the boundary line between that prov. and Szechuen. At this stage in its course it receives the waters of the Ya-long-kiang from the N., and the Hêng Nan-kwang and K'ü-kiang from the S. Having a tortuous course, bending in an E.N.E. direction, it waters the provinces of Szechuen, Hupeh, Kiangsi, Hunan, Nganwei, Kiangsu, and finally empties itself into the Yellow Sea. Its chief tributaries in China which have not already been mentioned are the Min, P'ö, K'ai-ling, and Han from the N., and the Wu from the S. The total length is some 3000 m., of which 1500 are navigable by native rafts. The area drained by the Yang-tse is estimated at over 650,000 sq. m. The chief towns on its banks are: Fu-chow, P'ing-shü-hien, Chung-kiang, Hankow, Wu-chang, Nanking, and Ching-kiang.

Yanina, see JANINA.

Yankee, a term now used in Europe for any one born in the U.S.A. During the War of Independence it was derisively applied by British soldiers to the New Englanders.

Yankee Doodle, the national air of America, was probably a British tune taken to America prior to the War of Independence. The words are by Dr. Schuekburgh, a British medical officer.

Yankton, co. seat of Yankton co., S. Dakota, U.S.A., the seat of an important college. Pop. (1910) 3787.

Yapock (*Cheironectes variegatus*), a S. American marsupial about the

size of a rat and with webbed hind feet, being aquatic in habit.

Yard, a measure of length, equaling 3 ft., or 36 in., being the standard of English and American measures. The original measure of length was that of a grain of barleycorn—three dried grains placed end to end making 1 in. The length of the arm of King Henry I. was made the length of the *ulna* or ell, which answers to the modern yard.

Yare, a river of Norfolk, England, which empties into the sea at Yarmouth. Length 50 m.

Yarkand, a walled city of Chinese Turkestan, very near the R. Yarkand, about 100 m. S.E. of Kashgar. It has many mosques, caravansaries, Mohammedan colleges and bazaars. Leather goods, silk, carpets, and felt are among its manufs., and trade is chiefly with Russia and Kashmir. Pop. about 100,000.

Yarkand Daria, a river of Chinese Turkestan, which rises in the Karakorum Mts., and after a course of some 600 m. joins the Kashgar Daria, their united waters being known as the Tarim.

Yarland, or Yard Land, an old English measure of land, varying in different parts of the country from 15 to 20 acres.

Yarmouth: 1. Or Great Yarmouth, a parl. and co. bor., watering-place, and port of Norfolk, England. 20 m. E. of Norwich. It has fine quays, a marine parade, and two piers. The fisheries are excellent, the chief fish caught being herrings, mackerel, cod, and white fish. Pop. (1911) 55,808. 2. A small seaport off the N.W. coast of the Isle of Wight, 10 m. W. of Newport, on the mouth of the Yare. There is good yachting. Pop. 950. 3. The cap. of Yarmouth co., Nova Scotia, Canada, on the Bay of Fundy. It has shipbuilding yards, fisheries, and manufs. of machinery, boots, cotton goods, etc. Pop. (1911) 8500.

Yarmouth Roads, a roadstead in the North Sea, off Norfolk, affording fairly safe anchorage.

Yarn, spun fibres ready for being woven into cloth. When the fibres are simply twisted together, the material is known as single Y. Cotton Y. is counted by the number of single hanks of 840 yds. each in 1 lb. (avoirdupois); thus, Y. running thirty such hanks to the lb. would be called thirty counts. Linen Ys are of two kinds, line and tow. They are counted by the number of leas of 300 yds. in 1 lb. Woollen Y. is soft, fluffy, and elastic. In the W. of England it is counted by the number of hanks of 320 yds. in 1 lb., in some parts of Yorkshire by the number of

yards in 1 oz.; each district, however, has its own method of counting. Worsted Y. is smooth and strong. It is counted by the number of hanks of 560 yds. in 1 lb. Net silk may be Organzine or Tram; the former is more twisted than the latter, but both are extremely strong. Spun silk is made from the silk set aside in the manufacture of fabrics from the cocoons. Silk Ys. are counted by the weight of 1000 yds. in drams, or by the number of deniers in one hank, a denier being equal to $\frac{1}{54}$ lb. Ys. are folded for greater strength. Folded Ys. are counted according to the number of threads; thus two sixties means that two threads of sixty hanks to the lb. were twisted together, the quotient, therefore, being thirty hanks to the lb.

Yaroslav, or Jaroslav: 1. A gov. of Central Russia, with an area of 13,723 sq. m. It is watered by the Volga and its tribs. the Mologa and Sheksna. Flax and tobacco are grown, but the crops of wheat and rye are poor. The chief manufs. are chemicals, spirits, flour, and linen. Pop. 1,200,000. 2. The cap. of above gov., 160 m. N.E. of Moscow. It has a beautiful cathedral (1215), and manufs. silk, bells, tobacco, and white-lead. Pop. 72,000.

Yarrell, William (1784-1856), an English naturalist, born at Westminster. He contributed articles to the journals of the Linnæan and Zoological societies, of which he was a fellow, and wrote a *History of British Fishes* (1835-36) and *History of British Birds* (1839-43).

Yarrow, or Milfoil (*Achillea millefolium*), a common wayside plant (order Compositæ).

Yarrow Water, a small river of Scotland, which rises at Yarrow Clough in Selkirkshire, and flowing through lochs Lowes and St. Mary, enters the Ettrick 2 m. above Selkirk. Its praises have been sung by many Scottish poets as well as by Wordsworth.

Yass, a tn. of New South Wales, on the R. Yass, in the Yass Plains, with deposits of gold and silver in the neighbourhood. Pop. 2500.

Yass-Canberra, a locality in New South Wales, Australia. the proposed site of the Federal capital of the Commonwealth, lies about 150 m. S.W. of Sydney; 800 sq. m. being acquired in 1911.

Yassy, see JASSY.

Yawl, see SAILS and RIGGING.
Yawning, an abnormal act of respiration. It consists of a long inspiration, followed by a short expiration, the mouth, fauces, and glottis being kept open. It is an involuntary act induced generally by fatigue, but is often due to imitation of another person's Y.
Yaws, or *Frambasia*, a tropical disease characterised by the formation of red, raspberry-like tubercles upon the face, toes, and genital organs. It is an infectious disease, and chiefly affects young negroes, though white men may suffer from it. It is endemic in the tropical parts of Africa, in Ceylon, East and West Indies, and many of the Pacific Islands. The treatment consists of absolute cleanliness, together with the application of antiseptic lotions.
Yazoo City, the cap. of Yazoo co., Mississippi, U.S.A., 42 m. E.N.E. of Vicksburg. Pop. (1910) 6796.
Yeadon, a tn. of Yorkshire, in W. Riding, 4 m. S. of Otley, with woollen manufactures. Pop. (1911) 7442.
Year. There are three kinds of Y. That most usually employed is the solar, tropical, or equinoctial Y. This is the period intervening between a position of the sun and the occurrence of the next identical position, after its cycle of ascent and descent on the meridian. This is conveniently taken from equinox to equinox, when the sun is vertical at the equator, or, as reckoned in the calendar, from winter solstice to winter solstice. The position of the sun is determined by the revolution of the earth in its orbit and by the inclination of its axis. The change in inclination resulting in the precession of the equinoxes (q.v.) causes the sun to appear in the same position earlier by 20 mins. than if the observation were made on a star. The latter gives the true period of revolution or sidereal Y., but as the

editor of *Town Talk*, and printed a personal article on Thackeray which the novelist resented, and which resulted in Y.'s expulsion from the Garrick Club and caused a breach between Thackeray and Dickens. After several journalistic ventures, he founded *The World* in 1874. Ten years later he published his *Recollections and Experiences*.

Yates, Frederick Henry (1797-1842), an actor, educated at Charterhouse, London, and went on the stage in 1818. In the following year he played with Charles Kemble and Young in *Othello* at Covent Garden, at which theatre he remained for six years. He then went to the Adelphi, which he managed from 1836 until his death. He was at his best in the classic rôle of Falstaff and Shylock.

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seasons depend on the sun's position, it is more convenient to use the tropical Y. for every-day purposes, the former being more usual for astronomical calculations. The sidereal Y. is 365 dys. 6 hrs. 9 mins. 9 secs.; the tropical, 365 dys. 5 hrs. 48 mins. 46 secs. The *anomalous* Y. is reckoned from perihelion to perihelion, and as the line of apsides (*q.r.*) moves constantly slowly eastwards, the length is greater by $4\frac{1}{2}$ mins., being 365 dys. 6 hrs. 13 mins. 48 secs. This is used astronomically in calculations on perturbations. The measurement of time over extended periods in ancient times, or among barbarous peoples, was usually based on seasonal activity, but religious observances soon introduced more accurate methods, which depended on the more easily recognised changes in the phases of the moon. Lunar changes are, however, incommensurable with the tropical Y., and it was usual to have a *leap year* with arrangement for days or months to keep place. The Mohammedan reckoning is still lunar, the Y. having 12 lunar months, and contains alternately 354 and 355 days. This gives a gain of 1 in 33 and causes the seasons continually to fall in different months. The *Metonic cycle*, discovered by Meton about 433 B.C., among the Greeks, reckoned from new moon to new moon, and contained 235 synodic months, approximately 19 years of 365 $\frac{1}{4}$ dys. This cycle still remains in the *Golden Number*, which is found by adding 1 to the date number and dividing by 19, the remainder being the required number; if 0, it is considered 19. The *Calliptic cycle* takes account of leap Ys., and consists of 4 Metonic cycles or 76 yrs. In the year 45 B.C. Julius Cæsar, with the help of Sosigenes, reformed the calendar, and introduced the *bissextile* Y., or leap Y., the sixth day before the kalends of March being counted twice. The previous Y. was made 445 dys. long and was known as the Y. of confusion. The Y. being approximately 365 $\frac{1}{4}$ dys., and only 365 being counted, an odd day is added every four Ys. to compensate; these are *leap* Ys. This, however, overcompensates, and to allow for that century date numbers are only leap Ys. if divisible by 400. The *fictitious* Y., used in the reduction of star places, begins at the moment when the sun's mean longitude is 280°, which always occurs some time during Dec. 31; the star catalogue takes no account of aberration or the irregular motion of the celestial pole, and the reduction is necessary to give apparent instead of mean

position. The *Julian cycle* consists of 7980 yrs. of 365 $\frac{1}{4}$ dys.; its starting point is Jan. 1, 4713 B.C., Jan. 1, 1 A.D., being J. E. 4714. The *Julian* Ys. are used in astronomy as harmonising different chronological systems. *Jewish* Ys. are arranged in cycles of 19; the 'embolismic' Ys. the 3rd, 6th, 8th, 11th, 14th, 17th, and 19th have 13, the others 12 months each.

Yeast, or *Saccharomyces*, an organic compound consists of rounded, almost transparent cells, which bud and multiply when placed in certain sugar solutions containing small quantities of mineral substances. Alcoholic fermentation is brought about by its action, which proceeds best at a temperature of from 5°-30° C. See BREWING—Fermentation, ENZYMES, and FERMENTATION.

Yeats, William Butler (b. 1865), a poet and critic, a native of Dublin. Y. studied painting for a while at the school of art there, but soon realised his true bent was for literature, since then he has published numerous books of verse, notably *The Wanderings of Oisín*, 1889; *The Wind among the Reeds*, 1899; and *Poems*, 1899; while he has also edited the writings of Blake, and has issued a volume of pure essays, *Ideas of Good and Evil*, 1903. His activities have also been given to lecturing, both in England and America, while he was among those instrumental in founding the Literary Theatre in Dublin, and subsequently he has been closely associated therewith. His best work is essentially Irish, reflecting just that wistful, pensive temper characterising the old Celtic bards of whom Y. is an avowed disciple.

Yecla, a tn. of Murcia, Spain, in a vine and fruit-growing district. Pop. 13,000.

Yedo, see TOKYO.

Yegorievsk, a tn. of Russia, in Ryazan gov. Pop. 24,000.

Yeisk, a seaport on the Sea of Azov, Kuban province, Russia. Exports grain. Pop. 42,000.

Yeizan, a Japanese artist. He appears to have lived early in the nineteenth century, and to have begun life as a maker of artificial flowers. Afterwards he worked as a designer of *surimono*, these being virtually the Christmas cards of old Japan, but anon he gave his energies to woodcuts done in emulation of Utamaro. Y. was a master of composition, even the bare spaces in his prints appearing essential to the curvethym of the design.

Yekaterina, the naval base of Alexandrovsk, on the Arctic Ocean, in the gov. of Archangel. It has a fine harbour, which is always ice free.

Yekaterinburg, see EKATERINBURG.

Yekaterinodar, or Ekaterinodar, the cap. of Kuban prov., Russia, on the Kuban, with extensive trade in flour and corn. Pop. 70,000.

Yekaterino-Nibolsk, a township in the Amur prov., Siberia, on the Amur.

Yekaterinoslav, see EKATERINOSLAV.

Yelatma, or Jeletma, a tn. of Tambov, Russia; manufactures farm tools. Pop. 9000.

Yelisavetgrad, see Elizabetgrad.

Yelisavetpol, or Elisabetpol: (1) gov. in Transcaucasia, Russia, tending from the Caucasus to borders of Persia. It is watered by the Kur and the Aras. The southern region is very mountainous, and in the E. lie the steppes. The chief products of the soil are liquorice, mulberry, vine, and various crops. There are copper mines, silk works, breweries, etc. Area 16,721 sq. m. Pop. about 1,100,000, composed chiefly of Armenians and Tartars. (2) Cap. of above gov. It has many mosques, and its old fortifications still stand. Pop. 38,000.

Yell, a gneiss island, second in size, of the Shetlands. Area 80 sq. m. Chief occupation is fishing. Pop. (1911) 2348.

Yellala Falls, the cataracts on the Congo, near Vivi, 110 m. from its mouth.

Yellow Bird, the name for two N. American birds, *Chrysomitris tristis*, goldfinch or thistle bird, and *Dendroica aestiva*, yellow poll warbler.

Yellow Fever, or Yellow Jack, is an endemic fever occurring in tropical and subtropical regions except where rainfall is deficient; the region round the Gulf of Guinea and the Caribbean Sea are the noted areas and include the W. Indies. It has spread as an epidemic further northward into the U.S.A. With the usual rise of temperature, vomiting and rigor are found after an incubation period usually of from one to four days. This in slight cases is the whole course. Jaundice and hæmorrhage are prominent symptoms, and as a rule a complete and serious reaction sets in after the first stage. Hæmorrhage becomes very prominent, stools and vomit being both affected. Both skin and kidneys exhibit hæmorrhage, and it is also common from the gums; the urine also contains excessive albumen. The

and enemata are administered in a nutritious form, while the heart is stimulated by tonics. One attack usually gives immunity; the negro is very little susceptible. Although the specific poison has not been discovered, the cause has been traced

to the mosquito *Stegomyia fasciata*, which was suggested by Dr. C. Finlay of Havana in 1881. Major W. C. Gorgas of the U.S.A. carried out thorough tests in 1901. These were based on the prevention of breeding by the mosquito, by keeping all water vessels mosquito proof and covering puddles and stagnant water with oil; drainage and sanitation were thoroughly inspected and improved with

measures so brilliantly carried out in the Panama Canal zone have completely confirmed the efficacy of the methods.

Yellow Hammer, or Yellow Bunting (*Emberiza Citrinella*), a common British bunting about 7 in. long, with a yellow head streaked with brown, and a slightly forked tail. The nest is built on the ground, and contains five eggs. It feeds largely on insects, but fruit and grain are also eaten.

Yellow Pigments, see PIGMENTS.

Yellow River, or Hoang-Ho, a riv. of China, which rises on the Odonatala plain, in the territory of Kuku-nor, Tibet. After an extremely tortuous course, it crosses the Chinese province of Kansu, flows into Mongolia, and then turns almost at right angles eastward into Shansi. It separates Shensi from Shansi, passes through Ho-nan, and flows into the Gulf of Pechili. The most important towns on its banks are Lun-Chow and K'ai-fung, and its chief tributaries are the Wei-ho coming from the W., and the Ta-tung-ho from the N. The river has come to be known as 'China's sorrow' on account of its tendency to burst its banks and to change its course. Formerly its mouth was in the Yellow Sea. Its dams and dykes date from very early times. The Y. R. is the second longest in China, and has a length of about 2500 m.

Yellow Sea (Hoang-Hai, or Hwang-Hai), a large gulf of the Pacific Ocean, its length being about 620 m., and its greatest width 400 m. It is divided into the gulfs of Pechili, and islands. It have been mud carried

Yellowstone a riv. of the U.S.A. Mts. of N.W. through the Yellowstone National Park, entering Yellowstone Lake at an elevation of 7740 ft. above the level of the sea. It pours down the two cascades known as the Upper and Lower Falls, and then passes through a beautiful gorge called the Grand Cañon. It joins the Missouri R. from the N.E. at Burford. Its chief tributaries are the Big Horn,

Powder, and Rosebud. Total length 1000 m., of which nearly 800 are navigable.

Yellowstone National Park, U.S.A., occupies part of the territories of Wyoming, Montana, and Idaho, and lies between 44° 8' and 45° 6' N. lat. It is less a park than a series of parks formed by different valleys on the two sides of the Rockies. Is subject to great extremes of climate, often freezing at night after scorching days. The whole region is of geologically recent volcanic origin, and the geysers are still active and famous. They are said to number over 10,000, the largest being the Excelsior. The highest peaks in the park are the Washburn, Chittenden, Langford, Doane, Stevenson, Turret, Sheridan, Electric, Baronet, and Norris Mts. The chief lakes are the Four Cantons, Lewis, Heart, and Shoshone. The Yellowstone is the chief river. The whole region is one of wild and varied beauty and of all sorts of curious thermal phenomena. The first white to attempt an exploration of the region was a trapper named Coulter, who in 1805 traversed a part of this district. His tales were disbelieved, but were confirmed thirty years later by the discoveries of Bridger. In 1870 the first official survey was made, and in 1871 Hayden's famous expedition revealed the glories of the Yellowstone district. See Hayden's Reports, 1872, etc.

Yellow Wood, a name given to various trees, principally *Cladrastis tinctoria*, a small leguminous tree, sometimes grown in gardens for its spikes of white flowers.

Yemen, a region in S.W. Arabia, bounded on the N. by Hejaz and Nejd, on the E. by Hadramaut, on the S. by the Gulf of Aden, and on the W. by the Red Sea. It is divided into the four vilayets of Sana, Tais, Asiro, and Hodeida, and has an area of about 73,000 sq. m. Pop. (estimated) 750,000.

Yenikale, see KERCH or KERTCH.

Yenisei, a river of Siberia (3000 m. long). Rises in Mongolia, and flows W. as far as the Russian border, and then N. to the Arctic Ocean. Area of basin about 1,000,000 sq. m. Drains the regions of Yeniseisk and S. Irkutsk. Chief tributary the Angara. The chief town on its banks is Yeniseisk, the old cap. of the province. The river is very broad, and spreads out into a large estuary with several wide mouths. It is navigable in summer for 1500 m.

Yeniseisk: 1. A large province of Siberia, between Yakutsk on the E. and Tomsk on the W. Area 921,295 sq. m. Slopes from S. to N. Is drained by the R. Yenisei. The pop. of the

warmer slopes in the S. grow grain and rear cattle; those of the N. fish and hunt. Area 981,607 sq. m. Pop. 860,000. 2. A tn. on the Yenisei, formerly cap. of foregoing. Has a considerable fur trade, and a flourishing market; a custom-house, an arsenal, and four churches. Circumference of walls, 3 m. Pop. 13,000.

Yeola, a tn. of the Nazik dist., Bombay, India, with silk thread and cloth manufactures, and gold and silver wire-drawing. Pop. 17,000.

Yeoman was anciently a forty-shilling freeholder, and as such qualified to vote and serve on juries. In more modern times it meant a farmer who cultivated his own freehold.

Yeomanry, volunteer cavalry forces organised in almost every county during the period following the French Revolution, a time when the danger of invasion was considered imminent. Since 1908 the whole Y. force has been absorbed into the cavalry section of the territorial force.

Yeomen of the Guard, an ancient royal bodyguard employed on state occasions as part of the sovereign's retinue. It was founded by Henry VII. and its members still retain the costume of the period of their foundation. It is formed of old soldiers of fine appearance and numbers 100 men. The vulgar name Beef-Eaters, by which the Y. of the G. are known, has no reference to the diet particularly favoured by them, but is a corruption of *buffetiers*, a name given them because they were stationed in state banquets at the buffet or sideboard.

Yeovil, a municipal bor. and market tn. of Somersetshire, England, on the R. Yeo. The church of St. John the Baptist is a fine cruciform structure with a 15th century tower. Y. is noted for its mannf. of gloves. Pop. (1911) 13,760.

Yerkes, Charles Tyson (1837-1905), a native of Philadelphia. He started business as a stockbroker at the age of twenty-one with remarkable success, and about 1873 became connected with a tramway enterprise in Philadelphia, which he developed with great profit. A few years later he settled in Chicago, and there installed a tramway system which realised him a very considerable fortune. Y. also founded the Yerkes Observatory at Lake Geneva, and while resident in London, from 1901, devoted himself to improving the means of transit in and around the metropolis. He was associated with numerous tube and other railway undertakings, and had managing control of the District system, which he electrified.

Yessel, see LISSEL.

Yessentuki, a vil. of Asiatic Russia

W. of Pyatigorsk; noted for its alkaline springs containing iodine and bromine.

Yetholm, a vil. of Roxburghshire, Scotland, on Bowmont Water, $7\frac{1}{2}$ m. from Kelso. Pop. (1911) 755.

Yew, or *Taxus baccata*, a British evergreen tree, with linear leathery leaves and dioecious flowers, followed by bright rose-red cup-shaped fruits or arils. The tree attains a very great age; its wood is hard and close grained but splits readily. It was formerly used for making long-bows. Its leaves and seeds, but not the fleshy part of the fruit, are poisonous. It is used medicinally in India but not in Britain.

Yezd, a tn. of Persia, 165 m. E.S.E. of Isfahan, the centre of the silk industry of Persia. Y. contains eighteen mosques, one of which, the Masjed i Yama, dates back to 1119. Pop. 45,000.

Yezidis, or Shemsieh Kurds, a religious sect whose chief settlement is in the Sinjar hills, N. of the Mesopotamian plain. They are also found on the Van and Erzerum plateaux, in Persia, and in Transcaucasia, near the E. bank of Lake Gokcha. They hold beliefs derived from Mohammedan and various other sources, and are commonly called 'Devil Worshipers.' Their supreme being is Satan, whom they worship in the form of a peacock, and their great saint Sheikh Adl, whom they pretend wrote a code of doctrine, the so-called Aswad, or 'Black' Book. The Y. are far superior morally to their Nestorian or Gregorian, Shiah, or Sunnite neighbours. They are perfectly honest, showing a scrupulous regard for the property of others. They are also extremely courteous to strangers, kind to each other, faithful to the marriage vow, and of industrious habits.

Yezo, Yesso, Ezo, or Hokkaido, the largest of the islands of Japan. Honshu lies to the S., and Saghalien to the N. Area 36,289 sq. m. The lie of the mountains is from N. to S., there being many volcanoes. The island is partly of volcanic origin. It has many good harbours. The N. is fertile, producing wheat, rice, and timber. Gold and silver are mined. The primitive Ainos have been some-
times dying
Japanese

mytho-
inds to-
gether heaven, earth, and hell. Its roots run in three directions: one to the Asa gods in heaven, one to the frost giants, and the third to the under world. Under each root is a fountain of wonderful virtues. In the tree,

which drops honey, sit an eagle, a squirrel, and four stags. At the root lies the serpent, Nithlöggr, gnawing it, while the squirrel, Ratatöskr, runs up and down to sow strife between the eagle at the top and the serpent.

Yiddish (Ger. *Judisch*, Jewish), a polyglot jargon, used for intercommunication among the Jews. It is really a corrupt form of Hebrew, and prevails in the East End of London, where two daily papers, the *Jewish Express* and the *Jewish Journal*, each one half-penny, are published in this dialect. Y. is also commonly spoken in Central Europe. See Max Grünbaum, *Yiddish Chrestomathy*, and Wiener, *The History of Yiddish Literature in the Nineteenth Century*.

Ymuiden, or Ijmuiden, a seaport of Holland in the prov. of N. Holland, 6 m. from Haarlem. It stands at the end of the North Sea Canal, by which it is connected with Amsterdam. This canal, which is one of the most important waterways of Holland for transmarine traffic, was widened and made deeper in 1911. Pop. 2500.

Yo-chow, a city in the prov. of Hunan, China, at the outlet of Tungting lake. It is a depôt for native products destined for export and for foreign goods on their way inland. Pop. 20,000.

Yoga, the fourth of the six systems of Hindu philosophy, commonly regarded as a theistic development of the Sankhya, directly acknowledging Ishvara, or a supreme being. Its alleged author is Patanjali, and its aim is to teach the means by which the human soul may attain complete union with the Supreme Soul.

Yokkaichi, a tn. of Japan, 50 m. E. of Kyoto. It is one of the thirty-three ports of Japan which are places of call for foreign steamers. It was opened in 1899. Pop. about 30,000.

Yokohama, a seaport of Japan on Tokyo Bay in the ls. of Honshu. It has a good and commodious harbor, with a pier 2000 ft. long, but great improvements were begun in 1912, which are to be completed in 1916. Y. in 1859 took the place of Kanagawa, which was first appointed as the treaty port on the W. side of Tokyo Bay, the change being made partly for political reasons, partly because of the better anchorage at Y. Since then the town has grown rapidly and has considerable trade. The chief imports are cottons, woollens, metals, sugar, and petroleum; the chief exports silk, tea, copper, and coal. Pop. 391,303.

Yokosuka, a seaport and naval station of Japan on Tokyo Bay, 14 m. S.W. of Yokohama. Pop. 70,964.

Yola, a tn. and prov. in N. Nigeria, Africa. The latter has an area of

16,000 sq. m. and an estimated population of 300,500. The chief crops are cotton, rice, and tobacco. The town on the R. Benue is the capital of the province, and was founded by the Fula conqueror, Adama, about the middle of the 19th century.

Yonezawa, a tn. of Japan, Honshu. 63 m. from Niigata. Pop. 35,350.

Yonge, Charles Duke (1812-91), regius professor of modern history and English literature in Queen's College, Belfast; born at Eton. He was at first occupied by literary work in London, but in 1836 was appointed to the above-named chair which he held till his death. Among his many works are: *An English-Greek Lexicon*; *A Latin Grammar*; *A History of England from the Earliest Times to the Peace of Paris*; *Parallel Lives of Ancient and Modern Heroes, of Epaminondas and Gustavus Adolphus, Philip of Macedon, and Frederick the Great*; *An edition of 'Virgil' with Notes*; *A History of the British Navy from the Earliest Period to the Present Time*; *History of France under the Bourbons*; *The Constitutional History of England from 1755-1850*; *Our Great Naval Commanders*.

Yonge, Charlotte Mary (1823-1901), a novelist, born at Otterbourne. She published various historical works, a book on *Christian Names*, a *Life of Bishop Palleson*, and a monograph of *Hannah More*; but she is chiefly remembered as the author of *The Heir of Redcliffe*, which she published in her thirtieth year, *The Daisy Chain*, and *Modern Broods*, all of which were extremely popular.

Yoni, see LINGA PUJA.

Yonkers, a city of Westchester co., New York, U.S.A., on the Hudson R., N. of and adjoining New York City. It is a great manufacturing town, and produces carpets and rugs, and foundry and machine-shop products, besides confectionery, furniture, and hats. Pop. (1910) 72,503.

Yonne, an agricultural dept. of Central France, with an area of 2892 sq. m. It belongs to the basins of the Seine and the Loire, chiefly the former, and has a temperate climate, except in Morvan, where the extremes of heat and cold are greater, and where the rainfall is most abundant. Wheat and oats are the chief cereals, and the vine covers about 6 per cent. of the surface. Cap., Auxerre. Pop. 305,859.

Yorck (or York) von Wartenburg, Johann David Ludwig, Graf (1759-1830), an officer in the Prussian army, dismissed for insubordination (1778); he served in Holland for a time, returning to Prussia in 1786. Y. won distinction in the Polish campaign (1794), and commanded the Prussian

troops of Napoleon's 'Grande Armée' (1812). After Prussia's withdrawal from the French cause, he fought at Dannekow, Wartenburg, Möckern, Leipzig, Montmirail, and Laon (1813-14), and was created field-marshal (1821). See Droysen, *Leben* (10th ed. 1889); W. von Vosz, 'York' in *Erzieher des preussischen Heeres*, iv., 1906.

York, a city and borough of England, cap. of Yorkshire, seat of an archbishopric, on R. Ouse, 175 m. N.N.W. of London. Was a British and a Roman city, being known to the Romans as Eboracum. Constantine the Great was probably born there. Has always held a high position among English towns, and contains many historic buildings, including the Minster, founded 626; the present nave was built in 1291, and this cathedral is the finest Gothic building in the world; the churches of St. Michael-le-Belfry and St. Martin's in the Late Perpendicular style, the ancient Guildhall, etc. The prosperity of Y. has declined in comparison with that of other towns, but it remains an important residential and ecclesiastical centre. There are a few unimportant manufs., and a still flourishing market. Pop. (1911) 82,297.

York: 1. A city and co. seat of York co., Pennsylvania, U.S.A., on the Condorus Creek, 28 m. from Harrisburg. It has manufs. of foundry and machine shop products, tobacco, silk goods, food products, confectionery, shirts, and patent medicines, and is the trade centre for a rich agricultural region. Pop. (1910) 44,750. 2. A municipal tn. of Western Australia, 77 m. E. of Perth. It is situated 550 ft. above sea-level in a district which is the principal source of the sandal-wood supply. Pop. 3600. 3. A river in Virginia, U.S.A., formed by the confluence of the Pamunkey and Mattaponi Rs. It is the tidal estuary of the rivers which begins at West Point and flows S.E. to Chesapeake Bay.

York, Cardinal, see STUART, or STEWART, HENRY BENEDICT MARIA CLEMENT.

York, House of, a branch of the English royal dynasty of Plantagenet, descended from Lionel, Duke of Clarence, third son of Edward III., and Edmund, Duke of York, fifth son of Edward III. The head of the house was Richard, Duke of York, who was killed in the battle of Wakefield, 1460. His sons, Edward IV. and Richard III., and grandson, Edward V., were kings of England, 1461-55. The descendants of Edward IV.'s brother (Duke of Clarence) and sister (Elizabeth) became claimants after 1485. The last serious claimant was Richard

de la Pole (d. 1525). The title, Duke of York, is now generally borne by the second son of the reigning monarch. Henry VIII. and Charles I. both held the title previous to the death of their elder brothers, and James II. also was Duke of York before his accession to the throne, as was his present majesty, King George V., before he became Prince of Wales.

Yorke, Philip, see HARDWICK, PHILIP YORKE, first EARL OF.

York Plays, see MIRACLE PLAY.

Yorkshire, a N.E. maritime co. of England; bounded on the N. by Durham, S. by the shires of Nottingham and Derby, E. by the North Sea, and W. by Lancashire. It is the largest county in England, and is divided into three Ridings, N., E., and W., each forming a separate administrative county. The coast-line is fairly even with cliffs of an average height; the largest indentation is that formed by the mouth of the Humber, others being Bridlington, Floly, and Robin Hood bays. At Boulby the cliffs reach a great height (666 ft.), and again at Flamborough Head; Spurn Head at the mouth of the Humber being the other principal headland. The surface of the county is varied, being mountainous and moorland in the N., while the centre is a vast plain; in the N. also are beautiful valleys or dales. In the N.W. is the Pennine Range, reaching an elevation of 2414 ft. at Wharfedale; in the N.E. are the Cleveland and Hamilton Hills, and in the E. are the Wolds. The principal rivers are the Ouse (which with the Trent forms the estuary of the Humber, and is itself formed by the junction of the Swale and the Ure) and its tributaries the Wharfe, Aire, Calder and Don, with the Derwent on the E. In the N. is the R. Tees, and in the W. the Ribbles. The principal dales are Teesdale, Weasleydale, and Airedale. On the coast are a number of well-known watering-places, of which the most important are Scarborough, Whitby, Filey, and Saltburn-by-the-Sea. Scarborough is famous for its spa, as is also Harrogate, and there are mineral springs at several other places. Y. possesses valuable coalfields in the W. Riding, iron ore is obtained in large quantities (about 2,500,000 tons of pig-iron being obtained in the Cleveland district yearly), and lead, slates, limestone, sandstone, and fireclay are also worked. The N. Riding is the great agricultural district. Oats and barley are the main crops, with turnips and swedes; flax and liquorice are also grown. Sheep farming is carried on largely in the N. and W. Ridings, and the latter is famed for its cattle. Pigs are kept in large numbers, bacon

being a speciality. Dairy farming flourishes, cheese making being an important branch, and hunters and carriage horses are bred. The great manufacturing centres are in the W. Riding; woollen and worsted goods rank first at Leeds, Bradford, Halifax, Huddersfield, etc.; iron and steel goods come next with their centre at Sheffield, which is especially noted for plate and cutlery; leather is manufactured at Leeds, and there are chemical works, paper making, etc., among the lesser industries. Communication is excellent; besides the railways there is a system of canals which connects with the sea, the principal ports being Middlesbrough on the Tees, Hull on the Humber, and Goole on the Ouse. The county returns 26 members to parliament. York is the county town.

Y. formed part of the ancient kingdoms of Deira and Elmet, was conquered by the Danes in 875, and came under the rule of Harold of England in 1066 after the battle of Stamford Bridge. Since that date the county has been the scene of many battles: in 1138 the Scots were defeated at the battle of the Standard, Northallerton; in 1322 Edward II. defeated the barons at the battle of Boroughbridge; in 1399 Richard II. was murdered at Pontefract Castle; in 1453 the Wars of the Roses commenced with the fight at Stamford Bridge; and in 1460 the Duke of York met his death at Wakefield. During the Civil War the county was divided, and the principal battle was that of Marston Moor, when the Royalists were defeated. Y. is rich in antiquities; among the numerous castles the best known are those of Pontefract, Knaresborough, Richmond, Scarborough, and Skipton. Bolton Castle was one of the many prisons of Queen Mary; Carwood Castle was once the palace of the archbishops of York, and a residence of Wolsey; Conisborough Castle has been immortalised by Sir Walter Scott in *Ivanhoe* ; and there are others too numerous to mention. Of the ecclesiastical remains the most important are the abbeys at Bolton and Fountains, the Benedictine abbey of St. Mary at York, and the Cistercian abbey of Rievaulx; there are many others, besides a number of beautiful churches, of which the Minster at York (q.v.) is the finest. The area is: E. Riding, 1083 sq. m.; pop. (1911) 507,096. N. Riding, 1995 sq. m.; pop. 417,075. W. Riding, 2736 sq. m.; pop. 3,014,080. See Victoria County History—Yorkshire.

Yorkshire College, see LEEDS.

Yorkshire Terrier, a small long-coated dog, with long straight silky

hair reaching to the ground from the back of the head to the tail and parted in the middle of the back. It is bluish-grey with tan on the head, ears, and legs. The ears are small, V-shaped, and carried semi-erect; the body is compact and level on top of the back. The weight is about 5 lbs. It needs daily grooming, the coat being brushed straight down each side.

Yorktown, a tn. and co. seat of York co., Virginia, U.S.A., on the York R. Here the last important battle of the Revolutionary War was fought in 1781 when Lord Cornwallis surrendered to Washington. Pop. (1910) 136.

Yoruba, or Yarriba, a fertile and densely populated region of W. Equatorial Africa, included in the British colony of S. Nigeria. It lies S.W. of the Lower Niger (Quorra), adjoining Dahomey on the W. and Nupe on the N.E., and reaching from Borgu nearly to the Bight of Benin. Among the chief towns are Ibadan (chief commercial centre), Oyo (capital), and Abeokuta (capital of Egba province). Agriculture and cattle-rearing are carried on. Area about 18,500 sq. m. Pop. about 2,000,000. The people are negroes of some culture. The Mohammedan Fulahs captured Ilorin and destroyed the old native Y. kingdom (1820). See Ellis, *The Yoruba-speaking Peoples*, 1894; Gouzien, *Manuel Franco-Yoruba de Conversation*, 1899.

Yosemite Park, Central California, a national park embracing the Yosemite Valley, U.S.A. The region is composed of granite, but the river valley is extremely beautiful, with all kinds of flowering plants and tall trees for the 6 m. of its length. The Nevada Falls are among the finest in the world. Discovered in 1851 by Bolling and his soldiers who were fleeing from pursuit by Indians. It was made a national park by Act of Congress in 1864. It is still inhabited by a few Indians. See Whitney, *The Yosemite Book*, 1868.

Youatt, William (1776-1847), an English veterinary surgeon, came to London (1810) and with D. P. Blaine (d. 1848) opened a veterinary infirmary (c. 1812). His works include: *The Horse*, 1831, 1843; *Treatise on Cattle*, 1831; *The Pig*, 1837, 1860; and he edited *The Veterinarian*, a monthly, started in 1828, and perhaps the 6th and 7th editions of the *Complete Grazier*. See Simond, *Biographical Sketch*, 1896.

Youghal, a municipal bor., market tn., and seaside resort of Cork co., Munster, Ireland, on the W. side of the Blackwater estuary, about 27 m. E. of Cork, of which it is a sub-port. It contains St. Mary's church (11th century), a college founded in 1464,

Raleigh's house, and other interesting buildings. There are salmon-fisheries and exports of corn and livestock. Bricks, earthenware, and fine point-lace are made. Pop. (1910) 5300.

Youtmans, Edward Livingstone (1821-87), an American chemist and scientist, founder of the *Popular Science Monthly* (1872). He suffered from ophthalmia as early as 1834, and became blind for some years (c. 1840), but partially recovered later. Y. started scientific lectures in America (1852), published a chemical chart (1851), planned the 'International Scientific Series' (1871), and wrote among other works *Alcohol and the Constitution of Man*, 1853; *Handbook of Household Science*, 1857; and introductions to *The Correlation and Conservation of Forces*, 1864; and *The Culture Demanded by Modern Life*, 1868. He did much to popularise the works of H. Spencer. See Fiske, *Life and Letters*, 1894.

Young, Andrew (1807-89), a Scottish schoolmaster and poet, best known for his hymns, the most famous being 'There is a Happy Land.' He was headmaster of Niddrie Street school (1830-41), head English master at Madras College, St. Andrews (1840-53), and then moved to Edinburgh, taking up philanthropic work. His works were collected as *The Scottish Highlands and Other Poems*, 1876. See Julian, *Dictionary of Hymnology*.

Young, Arthur (1741-1820), an agriculturist, was a practical farmer and wrote many books on agricultural and political subjects. His works include: *The Farmer's Letters to the People of England*, 1767; *Observations on the Present State of the Waste Lands of Great Britain*, 1773; *Political Arithmetic*, 1774; *A Tour in Ireland*, 1780, written after two years' experience as agent to Lord Kingborough in county Cork; the voluminous *Annals of Agriculture* (1784-1809), and the well-known *Travels in France*, 1792. He was elected a Fellow of the Royal Society in 1773, and appointed in 1793 secretary to the Board of Agriculture. Y. left behind him an *Autobiography*, ed. by M. Betham-Edwards (1898).

Young, Brigham (1801-77), an American, president of the Mormon Church. He joined the sect in 1832, soon rose to importance, and succeeded J. Smith as prophet and president (1844). Under his leadership the Mormons, when driven from Nauvoo, finally settled in Utah, founding Salt Lake City (1847). Y. proclaimed the doctrine of polygamy (1852), and his power declined when this was abolished by the government (1869). See *Mormons*, by Mackay (1851), Gunnison (1852),

Hyde (1857), Stenhouse (1873). Kennedy (1888).

Young, Charles Mayne (1777-1856), an actor, went on the provincial stage in 1798 and came to London nine years later, when he played Hamlet with success at the Haymarket. In the following year he joined John Philip Kemble's company at Covent Garden, and played most of the leading Shakespearian rôles. He acted with Kean at Drury Lane in 1822. He retired in 1832.

Young, Edward (c. 1683-1765), an English poet, educated at Winchester College and Oxford. Y. entered holy orders (1727) and became rector of Welwyn, Hertfordshire (1730). His most famous poem, *The Complaint, or Night Thoughts* (1742-46), was inspired by the death of his wife, Lady Elizabeth Leo. The work abounds in hyperbole and antitheses, but was much admired. There are German translations by Ebert (1760-71), Zel-Sternau (1825), and Von hausen (1844). Other works

the tragedies *Busiris* (1719) and *The Revenge* (1721); *The Love of Fame, the Universal Passion* (1725-28), in verse; and *The Centaur not Fabulous* (1755), in prose, both satires; and an essay *On Original Composition* (1759) (see *Shakespeare-Jahrbuch*, 1902). His collected Works were published 1757. See ed. with biography by Doran (1854). Consult Croft in Johnson's *Lives of the English Poets*; Mitford's *Life* (1854); Villemain, *Oeuvres*, vii., 317, x., 313 (1856); G. Eliot, *Essays*, 1884; Barustoff, *Young's Nachtgedanken*, 1895; Thomas, *Le Poète E. Young*, 1901; Kind, *E. Young in Germany*, 1906.

Young, Sir Frederick (1817-1913), a famous statesman, remembered of the world in life. Greece. His two divisions: first, to found (in his own words) 'a permanent union of the mother country and her colonies'; second, to save open spaces for the public, as in the cases of Epping Forest and Victoria Park. His chief books are: *Long Ago and Now*, 1863; *Imperial Federation*, 1876; *A Winter Tour in South Africa*; *A Senate for the Empire*; *Exil Party*; and *A Plover in Canada*.

Lord Justice, burgh. (1862-1866-74), and senator of the College of Justice. Y. was sheriff of Inverness-shire (1853-60) and of Berwick

and Haddington (1860-62). He was Liberal M.P. for Wigtown Burghs (1865, 1868, 1874), his seat being warmly contested on the last occasion. He drew up a Public Health Act for Scotland (passed 1871), and was admitted as an honorary bencher of the Middle Temple (1871). Y. retired from his position as judge (1905). See *Dr. Guthrie's Memoirs*, ii. 291; *Notable Scottish Trials*, p. 286; *Scotsman* (May 12 and 23, 1907).

Young, Sir George, third Baronet (b. 1837), an English lawyer, educated at Eton and Cambridge, grandson of W. M. Praed (1802-39), whose works he edited (1864-88). Y. was a member of the Royal Commission (1871-73), the Factory and Workshop Acts Commission (1875, as secretary), the Irish Land Acts Commission (1881). He became chief clerk of the endowment (1903-6), and advocated the University

1888, 2nd ed., 1906; *Poems from Victor Hugo*, 1902.

Young, James (1811-83), a Scottish chemist, assisted Thomas Graham at the Andersonian Institution, Glasgow (1832), and later at University College, London. He became manager of Messrs. Muspratt's chemical works at Newton-le-Willows (1839), and of Messrs. Tennant's at Manchester (1844). In 1847 he began his analyses for machinery.

Y. took out a patent for the dry distillation of coal, and thus obtained various oils and paraffin. Works were erected at Bathgate and Addiewell, and in 1866 a limited company was formed. Y. did much to develop the American petroleum industry. Lyon Playfair and David Livingstone were both his friends, and he sent an expedition in search of the latter (1872). See Blake, *Personal Life of Livingstone*, 1880; Wemyss Reid, *Memoirs of Playfair*, 1883; *Chemical News*, xlvii., 1883; Mills, *Destructive Distillation*, 1866.

Young, Robert (1822-88), a Scottish missionary and biblical scholar, set up as a printer and bookseller (1847), and superintended the Mission Press at Surat (1856-61). He was head of the missionary institution at Edinburgh (1864-74), and noted as an Oriental scholar and linguist. His works include: *Bible Commentary*, 1870; *Analytical Concordance to the Bible*, 1879; *Grammatical Analysis of the Hebrew, Chaldaic and Greek*

Scriptures, 1885. See Schaft, *Ency. of Living Divines*, 1887.

Young, Thomas (1773-1829), an English physician, physiologist, and Egyptologist, born at Milverton, Somersetshire. At an early age he studied languages, but afterwards decided to adopt the profession of medicine, and studied in London, Edinburgh, and Göttingen. He soon settled in London as a physician, and continued to practise till his death. He devoted himself to the study of natural philosophy, and wrote papers *On Vision*, and *Outlines of Experiments and Observations respecting Sound and Light*. The subject was resumed in his other papers, *The Theory of Light and Colours* (embracing the fact of the interference of light, then first made known) and *Experiments and*
to *Physical Optic*.

He published his *Lectures on Natural Philosophy*, which involved a great deal of research. He became secretary of the Board of Longitude in 1818, and after the dissolution of that body, conductor of the *Nautical Almanac*. Y. also did much work in the interpretation of Egyptian hieroglyphics, and was the first to translate the inscription on the Rosetta Stone.

Young England, a section of the Conservative party, whose spirit and aim is well shown in Disraeli's *Coningsby*. The author of this novel and Lord John Manners, Duke of Rutland, were the chief leaders of the movement, which aimed at a revival of the mediæval relations between the upper and lower classes, as an antidote to the rapid spread of democratic principles. The movement began about 1842.

Young Europe, an international association formed in 1834 to link together the various democratic unions which had been formed in the various European countries, such as Young Germany, Young France, Young Italy, etc. Its headquarters were in Switzerland, but its influence was of very short duration.

Young Germany, a school of German writers which flourished from about 1830 until the revolution of 1848. They were liberal and rationalistic in tone and aimed at making literature a force in national life. Among its chief exponents were Heine, Gutzkow, Laube, Heller, and Wienburg.

Young Ireland, an Irish political party which arose during the forties when the agitation for Irish Home Rule became intense. Its aim was to unite the Catholics and Protestants of Ireland in a final united attempt to sever the union between England and Ireland. It brought about a slight but unavailing insurrection.

Its chief leaders were Thomas Davis, Gavan Duffy, John Mitchell, John Dillon, and William Smith O'Brien.

Young Italy, a political association organised by Mazzini in 1831, which aimed at freeing Italy from Austrian domination, and uniting it under a democratic form of government. Its work ceased after 1848.

Young Men's Christian Association (Y.M.C.A.), an association for banding young men together in an effort to improve themselves, spiritually, intellectually, and physically, founded in 1844 by (Sir) George Williams, then a clerk in a drapery establishment. The movement, thus started, spread rapidly throughout London and the provinces, and under a slightly different form in America. As its aims grew more ambitious, and its range greater, more organisation was necessary, and the first great international convention was held at Paris in 1855. It now embraces more than 8000 associations and has close on a million members. The year 1912 was marked by the creation of the Central Y.M.C.A. Institute in Tottenham Court Road, from which all information about the association can be obtained.

Youngstown, the cap. of Mahoning co., Ohio, U.S.A., on Mahoning R., 65 m. S.E. of Cleveland. It has coal, iron, and lumber industries, foundries, blast-furnaces, and machine shops. Pop. (1910) 79,070.

Young Turk Party, see TURKEY.

Young Women's Christian Association (Y.W.C.A.), an association formed in 1855 on the lines of the Y.M.C.A. to minister to the needs of the other sex. It was re-organised on a universal basis in 1894, and now includes fifteen associations each having its headquarters in a separate country. The British association is divided geographically into five divisions. It has close on 2000 branches and a membership of over 100,000. It issues a variety of publications.

Ypres (Flemish *Yperen*, *Ypern*), a fortified tn. of W. Flanders prov., Belgium, on the Yperlee, 12 m. from Courtrai. It was famous in the middle ages. Its markets, 'Les Halle' (1201-1342), and St. Martin's Church date from the 13th century. It contains a Gothic meat-market, a Renaissance town-hall, and the 'Templars' houses. Its woollens were noted in the 14th century, but the chief manufs. are now laces, linen, and thread. Pop. 17,070.

Ypsilanti, or Hypsilanti, a noble Greek Phanariot (Fanariot) family of the 18th and 19th centuries who claimed descent from the Comneni, and rose to great power in Constanti-

nople. Among the chief members were: 1. *Alexander Ypsilanti* (1725-1805), a statesman and soldier, hospodar of Wallachia (1774-82, and from 1790-92), and dragoman of the Porte. He was killed by the Turks on a charge of treason. 2. *Constantine*, his son (d. 1816), was also hospodar of Moldavia (1799) and Wallachia (1802-5). Deposed (1805), he fled to Russia, and next year at Bucharest again tried to liberate Greece, but was unsuccessful. 3. *Alexander*, son of above (c. 1792-1828), was a patriot who fought in the Greek War of Independence. He served in Russia (1812-13), was chief of the Greek 'Hetairists' (1820), but misused his power, and after a crushing defeat at Dragashan (1821) surrendered to the Austrians, was imprisoned for years, and died in Vienna. See *La Garde-Chambonas, Seurenirs*. 4. *Demetrius* (1793-1832), his brother, helped to capture Tripolitza (1820), checked the Turks by his defence of Argos, and resisted Ibrahim at Napoli (1825). He tried to emancipate the Christians in Turkey, and was appointed Greek commander-in-chief in E. Hellas (1828-30) by Capo d'Istria. The city in Michigan, U.S.A., was named after him (1825). 5. *Nicholas*, another brother, left *Mémoires*, edited by Kamboroglous (1901). See *Philemon's* *Δοκίμιον ιστορικόν* (1859), and W. A. Phillips's *War of Greek Independence* (1897).

Yriarte, Charles Emile (1832-98), a French author, born in Paris and educated as an architect. He acted as a war correspondent in Morocco (1859) and Sicily (1860), and in 1881 entered the government service. His works include: *Portraits parisiens*, 1863; *La Vie d'un Patriote de Venise*, 1883; *Florence*, 1880; and *Autour des Bergia*, 1890.

Yriarte, Tomas de (c. 1750-91), a scholar and poet, born in Tenerife; obtained a civil appointment at Madrid, and edited the *Madrid Mercury*. His works include: *La Musica*, 1779; *Fabulas literarias* (Eng. translation, 1855), and *El Senorito mimado*, a comedy.

Ysopet, the name given to collections of fables in mediæval literature, the word being a title of *Aesop*. It is especially to the work of Marie de France, which consists of 103 fables in octosyllabic couplets, taken from 'an English version of a Latin translation of the Greek.'

Yssingeaux, a tn. of Haute-Loire, France, on a height 13 m. N.E. of Le Puy. Pop. 7700.

Ystad, a seaport of Malmöhus län, Sweden, on S. Baltic coast, 34 m. S.E. of Malmö, with a good artificial

harbour. It manufs. machinery, tobacco, matches, and chicory, and has shipbuilding yards. Pop. 11,305. Ystradyfodwg, see RHONDDA.

Yttrium (Y, 89), a rare metallic element allied to aluminium. It yields colourless salts, and forms an oxide, Y₂O₃.

Yü (d. 2197 B.C.), a Chinese emperor, the last of the three famous 'ancient kings' of great virtue, the others being Yao and Shun. He constructed many valuable defences against flood. His reign, which began in 2205 B.C., marks the beginning of the first, or Hsia, dynasty.

Yuan Shih-kai (b. 1860), a Chinese statesman, born in Honan. In 1882 he went to Korea, becoming Chinese imperial resident at Seoul, the capital, in 1881. He was expelled at the time of the Sino-Japanese War in 1893. In 1897 he was appointed judicial commissioner of Chi-li; in 1898 expectant vice-president of a board; in 1899 Junior Vice-President of the Board of Works; in 1900 governor of Shantung, and in 1901 viceroy of Chi-li. He was director-general of the northern railways, and consulting minister to the Government Council in 1902; minister of the Army Reorganisation Council in 1903; president of the Board of Foreign Affairs, and grand councillor (1907); and 'senior guardian of the heir apparent' in 1908. He was made Tukuang viceroy when the revolution broke out in 1911, and was Premier for a short time. On Feb. 19, 1912, he was elected provisional president of the Chinese republic.

Yucatan: 1. A peninsula of Central America, in S.E. Mexico. Length, 280 m.; mean breadth, 200 m.; coastline, 700 m.; area, 35,400 sq. m. The coast on the N. and W. is low and sandy, but higher and more indented on the E. many relics of the A state of above peninsula. Area, 35,200 sq. m. Cattle are raised, and sugar, tobacco, vanilla, maize, cotton, coffee, and hemp are grown. Pop. 337,020. The cap. is Merida.

Yucca, or *Adam's Needle*, a genus of evergreen shrubs (order aring, when of a good erect panicle with pendulous flowers from the centre of a circle of thick linear leaves. *filamentosa* is hardy, and flowers at an earlier stage than other species.

Yuen, or *Yuan*, a Mongol dynasty which ruled China during 1280-1367. It was founded by Kublai Khan, who built the new capital of Kwantung (Cambaiuc), later Peking. He died in 1294. Other rulers of this dynasty were Yüen-chêng (d. 1307), Wu-tsung

(d. 1312), Jén-tsung (d. 1320) and Shun-ti, who came to the throne in 1333, and was driven out by Chu Yüen-chang in 1367.

Yuga, a term in Hindu mythology used of long periods of time, or 'ages' of the world. These are four in number: (1) Krita, the golden age; (2) Treta, the age of wisdom; (3) Dvapara, the age of sacrifice; (4) Kali, the age of darkness, which began in 3101 B.C. The length of these ranges from 4000 divine years (Krita) to 1000 divine years (Kali).

Yukaghirs, a Siberian people, living E. of the R. Lena. They are one of the peoples known as Hyperboreans, and are lighter in colour than neighbouring tribes.

Yukon: 1. A territory of N. W. Canada. Area 206,430 sq. m. The N. and W. are mountainous, but in some places the valleys can be utilised for growing crops. Y. owes its prosperity to the discovery of the gold mines in the Klondyke region (1896), when thousands of goldseekers crowded in to share the spoils. Pop. 28,000. 2. A river of the Yukon territory, formed by the junction of the Rs. Lewis and Pelly. Length 2300 m., of which under favourable conditions some 1500 m. are navigable from the mouth in the Behring Sea. It was first explored from source to mouth in 1883 by F. Schwatka. Dawson's expedition in 1887 settled many points in connection with the geography of the river. See *The Annual Report of the Geological Survey of Canada*, 1888-89; see also W. Ogilvie, *Early Days on the Yukon*, 1913.

Yule (O.E. *geola*, *gehol*, etc.), the old name for Christmas, originally applied to the winter solstice and the rejoicings held at that time.

Yule, Sir Henry (1820-89), a British geographer and Orientalist, born near Edinburgh; joined the Bengal Engineers (1840), and served in the Sikh wars, and with Colonel Phayre's mission to Ava (1855). His works include: *Narrative of the Mission to the Court of Ava*, 1858; *Cathay and the Way Thither*, 1866; *Book of Ser Marco Polo*, 1871-73; and *Hobson-Jobson*, 1886, an Anglo-Indian colloquial dictionary.

Yuma (sons of the river), a tribe of N. American aborigines, being the most important branch of the Yuman stock. Originally living in Arizona and California, about the Colorado R., they now occupy a reservation in S.E. California. Their numbers, which are rapidly decreasing, are now about 650. They are of good physique and peaceful in disposition.

Yunnan, the most south-westerly prov. of China, bounded on the N.

and E. by Szechuen, Kweichow, and Kwangsi, and on the S. and W. by Annam, Siam, Burma, Tibet, the Shan states, and Tongking. Area, 146,680 sq. m. The surface is mainly a lofty, uneven plateau, broken by mountain ranges and the gorges of rivers. The mountains are highest in the N., where they reach 17,000 ft., sinking 7000 or 8000 in the S. The chief rivers are the Salwin, Yang-tse-kiang, Me-kong, Si-kiang, Song-ka, and Schwell. The plains and valleys are fertile, and agriculture and stock-raising are largely carried on, particularly in the S. and S.W. Excellent tea is produced. The mineral wealth is considerable and includes copper-ore, which has been mined for many years, gold, silver, lead, tin, and anthracite. Pop. 12,324,574, being 84 per sq. m. The capital, Yunnan-fu stands on lat. 25° 3' N.; long. 102° 40' E., near the N. shore of Lake Tien-chih, and on a great plateau at an elevation of 6400 ft. It is a walled city with numerous canals and has a large trade. Pop. about 100,000.

Yusafzais, a group of Afghan tribes, inhabiting a district stretching from the Black Mountain to the Utman Khel territory. They take their name from their founder Yusaf, son of Mandai, and number about 700,000.

Yusuf - ibn - Tashfin, see ALMORAVIDES.

Yuzgat, a tn. of Angora, Asia Minor, 85 m. N.W. of Kaisarieh, noted for its horses. Pop. 15,000.

Yverdon, or Yverdun, a tn. of Vaud, Switzerland, at the N. end of Lake Neuchâtel, 20 m. N. of Lausanne, with a 12th century castle used as a school. Pop. 8626.

Yvetot, a tn. of dept. Seine-Inférieure, France, 20 m. N.W. of Rouen, with important textile manufactures. It was formerly the capital of a small independent territory of the same name. Pop. 7100.

Yvon, Adolphe (1817-93), a French historical painter, born in Moselle, studied under Paul Delaroche in Paris and visited Russia in 1843. His works include: 'Repentance of Judas,' 1846; 'Battle of Kulikovo,' 1850; 'Napoleon Crossing the Alps'; 'Marshal Ney supporting the Rear-guard in Russia,' 1855; 'Storming of the Malakoff,' 1857-59.

Ywrieff, Ywiev, or Ywryev (formerly Dorpat), a tn. of Livonia, Russia, on R. Embach, 165 m. S.W. of St. Petersburg. It is a picturesque town, with gardens occupying the old fortifications, and has a ruined cathedral and a celebrated university, founded in 1632 by Gustavus Adolphus. There are numerous manufs., and the town is a trading centre. It was one of the Hanse towns. Pop. 44,140.

Z

Z, like Y, was only found in the later Roman alphabet, from which it has been transferred to the alphabet of W. Europe. In the letters it occupied the sixth being the property of the subsequently disused Vau or F.

Zaandam, or Saardam, a tn. in the prov. of N. Holland, the Netherlands, on the Zaan, 5 m. N.W. of Amsterdam. It has a great number of saw- and wind-mills, and manufactures paper, glue, tobacco, and dyes. In 1697 Peter the Great worked in the shipbuilding yards here. Pop. 24,579.

Zabern (Fr. *Saverne*), a tn. of Lower Alsace, Germany, on the Rhine-Marne Canal and the R. Zorn, 20 m. N.W. of Strassburg, manufactures tools, woollen cloth, and hosiery. Pop. 9153.

Zabians and Zabism, see SABÆANS.

Zabrze, a tn. of Silesia, Prussia, 8 m. W. of Königshütte, has coal-mines, iron, wire, glass, chemical, and oil works, and breweries. Pop. 63,225.

Zacatecas: 1. A state of Mexico; area 24,757 sq. m. Is rich in silver and other minerals. In the N. and E. are extensive cattle ranches. Pop. 475,863. 2. A city, cap. of foregoing, a centre for silver mining. Has a cathedral, a large college, and a mint. Pop. 25,905.

Zacharias, St. (d. 752), Pope, of Greek parentage; he succeeded Gregory III. as pope, and in that capacity exercised considerable political influence. He visited Luitprand, King of the Lombards, in 743, and confirmed Pepin the Short in his usurpation of the French throne. He started the Vatican Library and translated Gregory's *Dialogues* into Greek.

Zacynthus, see ZANTE.

Zadkiel, the pseudonym of Richard James Morrison (1794-1874), a retired naval lieutenant, astronomer, and Hebraist, who started a prophetic astrological almanac (1830) which attained great popularity.

Zadonsk, a tn. in the gov. and 60 m. N.N.W. of Voronezh, Russia, on the R. Don. Pop. 8300.

Zaffarines, Zafarani Is., or Chaf-farinas, three small islands belonging to Spain and lying off the N. coast of Morocco. Pop. about 650.

Zaffre, a crude oxide of cobalt obtained by heating the ore, which is used in the preparation of smalt.

Zafra, a tn. in the prov. of and 37 m. S.E. of the city of Badajoz, Spain, has a ruined castle. Pop. 6200.

Zagazig, a tn. of Lower Egypt, cap. prov. of Charkieh, 50 m. N.E. of Cairo. A busy and important market and is a centre for the cotton Pop. 34,999.

Zagoskin, Mikhail Nikolavitch (1789-1852), a Russian writer, was born in the government of Penza. He acquired some reputation by his comedies, one of which, *The Scapegrace*, was praised by Prince Tschakovski, a dramatist of influence, but he is chiefly remembered as a writer of historical fiction. His most popular novel is *The Picture of a*

clover picture (the picture of the works are *Rostislav*, a tale, and *Moscow and the Moscovites*, a series of essays.

Zagrob, Croatia, see AGRAM.

Zagreus (*Zaypeis*), a surname of the mystic Dionysus (*Διονύσος Ζέφυρος*). He was begotten in the form of a dragon by Zeus and Persephone, but was torn to pieces by the Titans. Thereupon Athena bore his heart to Zeus who swallowed it and became the father of the new Dionysus.

Zähringen, a vil. in Baden, 2 m. N. of Freiburg; noted for its ruined castle, which was the ancient seat of the dukes of Zähringen, from which house the reigning dynasty of Baden is descended.

Zaila, see ZAYLA.

Zaire River, see CONGO RIVER.

Zalsan, or Dzalsang, a lake in Senipalathinsk, Russian Central Asia, situated between the Tarbagatal and Altai Mts. It receives the waters of the Black Irtysh and empties itself into the Irtysh. Area about 700 sq. m.

Zakopano, a vil., Galicia, Austria, on the Hungarian frontier, 50 m. S. of Cracow, has iron mines. Pop. 7600.

Zaleucus (fl. 7th century B.C.), the earliest Greek legislator, who said he had received his code by revelation from Minerva. He settled in Locri Epizephyril, S. Italy.

Zama, a tn. in Numidia, N. Africa, 70 m. S.W. of Carthage, was the scene of Scipio's victory over Hannibal (201 B.C.) which ended the Second Punic War.

Zambales, a prov. in the W. of Luzon, Philippines. It is crossed by the Zambales Mts. and watered by a few unimportant streams. Indigo, sugar-cane, rice, and tobacco are cultivated. Pop. 105,000. The capital is Iba.

Zambesi, a river of S. Africa, extending mainly through Rhodesia and Portuguese E. Africa, about lat. 16° S. Its length of about 2200 m. is only exceeded in Africa by the Nile, Congo, and Niger; its drainage area is about 320,000 sq. m. It rises at a height of about 5000 ft. in N.W. Rhodesia, near the borders of Belgian Congo, some 300 m. E. of Lake Dibolo, whose waters it receives. Its general course is S.E. through the Baroki Valley to the Victoria Falls, where the Cape to Cairo railway crosses at Livingstone by a single span bridge over the gorge below the falls. These have a breadth of over a mile, and a height of 400 ft., the greatest in the world, though the volume of water is small, since the river has passed only through regions of deficient rainfall. Below the falls the gorge follows a zig-zag course, due to the faulting of the lava rock which the river is eroding. From here the river bends N.E. and E. nearly to Tete, when it resumes a S.E. course to the delta, situated some 200 m. N.E. of Sofala in the Mozambique Channel. Its volume is largely increased by the Shire, bringing the waters of Lake Nyasa. The delta has seven principal channels, of which the R. Chinde is the most important. The river is navigable for 120 m. from its mouth, though with difficulty in the dry season, and for special river steamers (stern-wheel) up to Tete, and on the R. Shire to Chiromo. Below Tete the Lupala Gorge has a width of about 200 yds. and a very strong current. In general, on account of the poor rainfall and the terrace formation which characterises the whole continent of Africa, the river is only navigable in isolated stretches and then precariously. Livingstone was the first explorer of the upper river between 1851 and 1853; he discovered the Victoria Falls (1855) during his descent of the river to its mouth.

Zambesia, an administrative dist. in Portuguese E. Africa or Mozambique, lying in the lower valley of the R. Zambesi. The chief products of the soil are rubber and sugar; some gold is found. The capital of the province is Quilimaue.

Zamboanga: 1. A dist. in the W. of Mindanao, Philippines, with an area of 3358 sq. m. Rice, tobacco, sugar-cane, coffee, copra, hemp, etc., are cultivated. Pop. 45,000. 2. Cap. of above. It is an old Spanish fortress, now an open port with naval stations. Pop. 3500.

Zamenhof, Lazarus Ludovic (b. 1859), inventor of Esperanto (q.v.).

Zamia, a genus of dwarf trees (order Cycadaceæ). *Z. caffra* is the bread tree, its pitb being used

by the natives of S.E. Africa for food.

Zamindar, see ZEMINDAR.

Zamora: 1. A prov. in Leon, Spain, on the Portuguese frontier. Area 4097 sq. m. It is watered by the Douro and its tributaries. Pop. 272,143. 2. City and cap. of above prov., on the Douro, 40 m. N.N.W. of Salamanca. It has a late Romanesque cathedral, and manufs. wines, woollens, and linen. Pop. 16,283. 3. A tn. in Michoacan state, Mexico, on the Zamora R., 200 m. W.N.W. of Mexico City. Pop. 10,000.

Zamosc, a fort. tn. of Russian Poland, in the gov. and 45 m. S.E. of Lublin, on the Wieprz. Pop. 12,000.

Zanardelli, Giuseppe (1826-1903), an Italian statesman, born at Brescia. He studied law at the University of Pavia, and afterwards served in the wars of 1848-49 and 1859. In 1876 he was appointed Minister of Public Works, and in 1878 Minister of the Interior. He soon, however, retired to Brescia, where he published *L'Avvocato*. He again entered political life, and was appointed Minister of Justice (1881-83 and 1887-91), and president of the Council (1901-3).

Zander Institute, a gymnasium established for the purpose of curing diseases by body movements, particularly those aided or initiated by mechanical appliances. The system was elaborated by Dr. Gustaf Zander in 1857, and in 1865 the Z. I. at Stockholm was established under his supervision. Since then other such institutes have been established in Germany and Sweden, and in 1911 a similar gymnasium was provided in Sheffield through the generosity of Mr. Edgar Allen. The germ of this method of therapeutics is to be found in the medical gymnastic system invented by Henrik Ling, of Stockholm, about 1810. Ling, after having suffered from rheumatism and general debility for several years, found himself perfectly cured through the exercise obtained while acting as teacher of fencing in Lund. After going through the orthodox medical training he gave his life to the work of demonstrating the merits of body movements in the cure of disease. The Zander system regulates the body movements by employing suitable apparatus. Thus a completely-equipped Z. I. contains machines for active movements, that is, machines which are put in motion by the muscular force of the patient; passive movement machines, that is, machines driven by steam or other motive power which themselves move the patients' limbs or apply various kinds of massage; apparatus for the correction of spinal curvature; and

apparatus for measuring the effects produced by any mechanical mode of treatment.

Zandvoort, a seaside resort, N. Holland prov., Netherlands, on the North Sea, 6 m. by rail W.S.W. of Haarlem. Pop. 3794.

Zanella, Giacomo (1820-88), an Italian poet and priest, born at Chiampo, near Vicenza. He was professor of Italian literature at the University of Padua from 1865-76. His chief work was a history of Italian literature during the last two centuries.

Zanesville, a city of U.S.A., cap. of Muskingum co., Ohio, on R. Muskingum. Has rail connections to Columbus. Manufactures hr tiles, and machinery, and is rapidly growing in importance. Pop. (1910) 28,926.

Zangwill, Israel (b. 1864), a man of letters, began life as a teacher and then became a journalist, since when he has written essays, novels, and plays. His first book, an amusing phantasy, *The Premier and the Painter*, appeared in 1888, and was followed by *The Bachelors' Club* (1891) and *The Old Maids' Club* (1892), clever works in which, however, the humour is overstrained. Z.'s best book, *The Children of the Ghello* (1892), is, as the title denotes, a study of Jewish life in England, and it is not only an interesting novel, but a valuable contribution to social history. Among his other books are: *The Master*, 1895; *Dreamers of the Ghello*, 1898; *The Mantle of Elijah*, 1900; and *GhELLO Comedies*, 1893.

Zante (ancient *Zacynthus*): 1. One of the Ionian Is., E. of Greece, 8 m. S. of Cephalonia; produces pitch, oil, and gypsum. Fruit is grown in large quantities. Earthquakes are of frequent occurrence. Area 277 sq. m. Pop. 42,500. 2. Cap. of Zanto Is., is a seaport on the E. coast, and exports currants, soap, olives, and fruit. Pop. 16,000.

Zanzibar: 1. A sultanate of Eastern Africa, under British protection since 1890, comprising the two islands of Z. and Pemba. Area of the sultanate is 1020 sq. m. The reigning sultan (b. 1906) succeeded on his father's abdication in 1911. The chief exports are cloves, ivory, copra, and rice. The exports in 1911 were valued at £1,193,139, and the imports at £1,179,699. Pop. 198,914. See Lync, *Zanzibar in Contemporary Times*, 1905, and Craster, *Pemba: the Spice Island of Zanzibar*, 1913. 2. An island of Eastern Africa, in the Indian Ocean, forming, with Pemba, the sultanate of Z. Area 640 sq. m. The soil is rich, the chief product being cloves. There are about 300 resi-

dent Europeans, the rest of the population being made up of heterogeneous African tribes. The chief towns are Zanzibar (capital), Tabora, Nyangwe, and Ujiji. Pop. 115,477. 3. Cap. of the above island, situated on its W. coast, and the residence of the British minister of the sultanate of the same name. It was once the greatest slave market in the world. It has an extensive trade in ivory, copal, caoutchouc, cloves, and copper ware. There are French and English hospitals, missions, barracks, etc. Pop. 35,000. See S. Plaync's, *British East Africa*, 1910.

Zaparos, a tribe of S. American Indians, well in the country of Pastaza and Napo. Characteristics of the Mongolic race and are polygamists.

Zapatoca, a tn. in Santander, Colombia, on the Sagamozo R., 160 m. N.N.E. of Bogotá. Pop. 8000.

Zapolya, or Zapoly, an illustrious Hungarian family of Slavonian origin: Stephen Zapolya (d. 1499), fought as a general under Matthias Corvinus, King of Hungary, in the conquest of Austria, over which he was appointed governor (1483). After the death of Corvinus, he procured the accession of Wladislaw II. His daughter, Barbara, by marriage with Sigismund I., became Queen of Poland. His son, Johann I. (1487-1510), proclaimed himself King of Hungary (1526) in opposition to Ferdinand of Austria. The Turks helped him in his struggle against Ferdinand, who finally reduced his territories to Transylvania. Johann II. (1510-71), son of the preceding, inherited the kingdom of Transylvania and part of Eastern Hungary.

Zaporogians, see COSSACKS.

Zapotlan, or Zapotlan el Grande, a tn. in Jalisco state, Mexico, 70 m. S. by W. of Guadalajara. Pop. about 18,000.

Zara (Roman *Iadera*), cap. of Dalmatia, Austria, on the Adriatic Sea, 52 m. S.E. of Trieste; manufactures maraschino, glass, oil, flour, and wax. It is a Roman Catholic and Orthodox ecclesiastical see, and has several notable churches, the cathedral dating from 1202. The town was a Roman colony; was purchased from Hungary by Venice in 1409, and passed to Austria in 1792. Pop. 36,600.

Zarafshan, see ZERAFSHAN.

Zaragoza, see Saragossa.

Zaria, an inland prov. of Northern Nigeria, with an area of 22,000 sq. m. It is watered by the Kaduna and its tributaries, and its soil is fertile, the chief products being cotton and groundnuts. The population is about 340,000.

Zarncke, Friedrich (1825-91), a German critic, born at Zahrenstorf in Mecklenburg-Schwerin. He entered upon a journalistic career, and in 1858 was appointed professor at the Leipzig University. He edited the *Nibelungenlied*, Brandt's *Narrenschiff*, and the Old Saxon poem called *Heliand*, and was an authority on German legends.

Zarskoe, see TSARSKOE SELO.

Zaruma, a tn. in the dept. of El Oro, Ecuador, W. of the Andes on the Tumbes. Gold and quicksilver are found. Pop. about 6500.

Zaslavl, a tn. in Volhynia, Russia, on the Goryn, 80 m. S.W. of Jltomir. Pop. 12,700.

Zbaraz, a tn. in Galicia, Austria-Hungary, 12 m. N.E. of Tarnopol. Pop. 9911.

Zea, see CEOS.

Zea Mays, see MAIZE.

Zea, Francisco Antonio (1770-1822), a Columbian statesman, born at Antioquia. He became professor of natural science at Madrid (1805). He joined Bolivar in S. America (1815) and was appointed vice-president of Colombia (1819). In 1820 he was sent on a mission to England and died at Bath.

Zealand, see ZEELAND.

Zealots (Gk. *ζηλωται*, an enthusiast, from *ζεω*, to boil), a loosely organised party among the Jews at the time of Christ. They carried on the Maccabean tradition, and were uncompromising in their resistance to all Roman authority. They aimed at the complete political emancipation of Judea, but were never able to carry on more than a desultory warfare. It was their fanaticism and vigour that brought about the rising which culminated in the Fall of Jerusalem. To this party belonged Simon, one of the Twelve Apostles.

Zebid (ancient *Sabea Regia*), a fort. tn. in Yemen, Arabia, 60 m. N. of Mocha. It is the seat of a Sunnite college. Pop. about 5500.

Zebra, a group of three equine species confined to the African continent. They are the true or mountain Z. (*Equus zebra*), Grevy's Z. (*E. grevyi*), and Burchell's Z. (*E. burchelli*). Until the middle of the 19th century a fourth species, the Quagga, existed, but this is now extinct. The mountain Z. has short clean legs, hard, well-shaped hoofs, and long ears. Its body colouring is silvery white with black or dark brown markings. It is a rapidly vanishing species. Grevy's Z. is a much larger animal and has finer and more numerous black or brown markings on a clear white ground. Burchell's Z. is intermediate in size, and its black or brown stripings are

differently arranged. These, when broken-in young, lend themselves more readily to domestication than the other species.

Zebu, or *Bos indicus*, an ox which exists only in a domesticated state in Asia. It is characterised chiefly by its large hump, or sometimes two humps, over the withers and by a greatly developed dewlap. Its colour varies from ashen grey to pure white, and white bulls, known as Brahmin bulls, are held sacred by the Hindus and allowed to wander at will. They vary greatly in size, and in India are used as beasts of burden and draught.

Zechariah, the eleventh of the minor prophets; was a contemporary of Haggai, whom he supported in urging the people to rebuild the Temple. The book which bears his name is clearly divided into two parts of very dissimilar character. The first part, consisting of chs. i.-viii., is universally regarded as the original work of Z., and as belonging to the years 520 and 518 B.C., the second and fourth years of Darius Hystaspes. The whole of the second part of the book (chs. ix.-xiv.) is placed by most critics after the Exile. It is possible that these six chapters come from the same unknown hand, having been written at different times and in view of very different circumstances. Some critics, however, see evidence of four different hands. It is impossible here to give a detailed analysis of either of the two big divisions (see *Temple Dictionary of the Bible*), but we may note the large outlook which the first section shows and its great emphasis on the necessity of moral obedience as of supreme importance in the service of Yahweh.

Zechstein, a German geological term applied to the Upper Permian, in the various strata of which many fossils are found. In some parts of N. Germany the Z. bears valuable deposits of kainite, gypsum, rock salt, and carnalite. The Z. overlies the Kupferschiefer, which consists of a bed of black bituminous shale, containing the fossils of many kinds of fish, leaves, and other organic remains.

Zedekiah, the last king of Judah and Jerusalem (597-586 B.C.) was originally named Mattaniah. He was set on the throne as vassal king by Nebuchadnezzar, when his nephew Jehoiakim was carried away to Babylon. He joined a coalition against Babylon, and Jerusalem was again taken. Z.'s eyes were thrust out and he, too, was carried away captive.

Zedlitz, Joseph Christian, Baron (1790-1862), a German poet, born at Johannsburg in Austrian Silesia, and

served in the army and in the Austrian foreign office. He wrote dramas and narrative verse, his best known works being: *Kerker und Krone*; *Stern von Scylla*; *Altnordische Bilder*; *Todtenkränze*; and *Waldfräulein*.

Zedoary, or *Curcuma zedoaria*, an Asiatic plant, the aromatic roots or rhizomes of which are employed in medicine. It is sometimes grown in the stovehouse.

Zeebrugge, a seaport, W. Flanders prov., Belgium, 7 m. N. of Bruges, whose port it is. It has a fine breakwater, and a ship canal (7 m. long), connecting it with Bruges, which was opened by King Leopold in 1907.

Zeehan, a tn. of Tasmania, 90 m. E.N.E. of Hobart, on the r. b. of the Badger. It is the centre of a silver-mining district. Pop. 3500, and rapidly growing.

Zeeland, the southernmost prov. of the Netherlands, has an area of 690 sq. m. Besides the mainland, five islands are included in the province. Surface very flat and often below sea-level. Climate very damp. Corn, butter, cheese are produced, and cattle reared. Chief towns, Middleburg (cap.) and Flushing. Pop. 232,515.

Zeeman's Effect, a modification of the lines of the spectrum due to the presence of a strong magnetic field. See H. Kayser, *Handbuch der Spectroscopie*, vol. II.

Zeerust, a tn. of Transvaal, S. Africa, 125 m. W. of Pretoria, on a right bank tributary of the Marico. It is in the centre of a district of great fertility and mineral wealth. Wheat and grapes are grown, and lead, silver, and gold are mined. Pop. 2000 (excluding blacks).

Zehlendorf, a tn. of Brandenburg, Prussia, 8 m. S.W. of Berlin. Pop. 16,861.

Zeitun, a tn. in the vilayet of Aleppo, Syria, 22 m. N.N.W. of Marash, on the E. slope of Mt. Zeitun. Manufs. agricultural implements. Pop. 10,000.

Zeitz, a tn. of Prussia, 25 m. S.S.W. of Leipzig. Has a fine cathedral. Manufactures cotton goods, machinery, and earthenware. Wine and spirits are also produced. Pop. 32,972.

Zelaya, a dept. of Nicaragua, on the E. coast, before 1891 a part of the Mosquito territory. The sovereignty of Nicaragua over the district was confirmed by treaty with Great Britain in 1905. Pop. 13,900.

Zelee, a tn. of E. Flanders, Belgium, 15 m. S.S.E. of Ghent; manufs. cotton and sail-cloth. Pop. 14,200.

Zell, or **Zelle** (Prussia), see CRILL.

Zella, a tn., Saxe-Coburg-Gotha, Germany, in the Thuringian Forest, 20 m. S.W. of Gotha. Pop. 3691.

Zeller, Eduard (1814-1905), a Ger-

man philosopher, born at Kleinbottwar in Württemberg. He was professor of theology at Bern in 1847, and at Marburg in 1849, but forsook theology for historical work, and occupied the chair of philosophy at Heidelberg in 1862 and at Berlin in 1872. His chief work was: *Die Geschichte der Griechischen Philosophie* (5th ed.), 1892, translated into English as *Socrates and the Socratic Schools*, but he also wrote *Stoics, Epicureans, and Sceptics*; *Plato and the Older Academy*; *The Pre-Socratic Philosophy*; *The Eclectics*; *Aristotle and the Early Peripatetics*.

Zenana (Persian *zan*, woman), the women's quarters in the house of a high caste Hindu family. The Z. is at the back of the house and overlooks the square or inner court. As a rule each woman has a small room to herself, on the second floor, the offices and kitchen being on the ground floor. No woman may go outside the Z., nor may she visit the men's quarters, as it is considered a disgrace for a Hindu woman to be seen by any man but her husband.

Zend, a word as to the ultimate use of which there is at present uncertainty. It is generally used for the language in which the sacred books of the Parsees were written, but some hold that the word means 'a commentary.' The *Zend-Avesta* is a collection of the ancient religious lore of the Parsees, and its authorship is traditionally ascribed to Zoroaster. It falls, however, into two main divisions, the Old Avesta and the New Avesta, which divide into a number of sub-sections. It is very diffuse, and is full of repetitions and trivial addresses to spirits good and evil. The critical study of these works has not yet been carried far. There is an edition by Geldner (1886-91) and a translation in the series of *Sacred Books of the East*. See also E. G. Browne's *Literary History of Persia*, 1903.

Zenith, the point where a vertical line terminates in the celestial sphere, and thus the opposite of the nadir. It is therefore an important point of reference in astronomy; Z. distance being the angular distance from the Z. and the complement of altitude. The Z. telescope, now superseded by the transit instrument, was invented for measuring the difference between the Z. distances of a pair of stars, culminating near the Z. at about the same time, one N., the other S., from which latitude can be determined by Talcott's method. By Sir G. Alry's reflex instrument, the star's image is viewed by reflection from a mercury surface.

Zenjan, a tn. of N.W. Persia, cap.

of Khamsch prov., on the Zenjan, 75 m. S.W. of Resht. Pop. 25,000.

Zenker, Friedrich Albert von (1825-98), a German physician, studied (from 1843) in Leipzig and Heidelberg. He became professor of pathological anatomy and general pathology at the medical academy of his native Dresden (1855), and of pathology and pharmacology at Erlangen (1862). In 1860 he discovered trichinosis. With Ziemssen he edited the *Deutsches Archiv für Klinische Medizin* from 1865. Z. retired in 1895. His publications include: 'Ueber die Trichinenkrankheit des Menschen,' in Virchow's *Archiv*. xviii. 1860; *Ueber die Veränderungen der willkürlichen Muskeln im Typhus*, 1864; 'Die Krankheiten des "Oosphagus"' in Ziemssen's *Handbuch der Pathologie* . . . vii., 1877; *Ueber den Cysticercus racemosus des Gehirns*, 1882.

Zeno (c. 340-270 B.C.), the founder of the Stoic philosophy, was a native of Citium in Cyprus. He studied philosophy first through the writings of the Socratic philosophers, but later went to Athens where he attached himself to the cynic Crates. In opposition to the advice of Crates he studied under Stilpo of the Megaric school, and later under Diodorus Cronus and Philo of the same school. He then proceeded to the Academics, Xenocrates and Polemo, and having thus spent some twenty years in study, opened a school for himself in the 'Painted Porch' Στοὰ Ποικίλη, which, at an earlier time, had been a place in which poets met. Hence his disciples were called Stoics. He was greatly admired by the Athenians as well as by Antigonus Gonatas, king of Macedonia.

Zeno (fl. 500 B.C.), a Greek philosopher, a native of Elea in Italy. He was the favourite disciple of Parmenides, whom he accompanied to Athens, and whose teaching he expounded. He was a lover of freedom, and on his return to Elea joined an unsuccessful conspiracy against the tyrant Nearchus. See Zeller's *Pre-Socratic Philosophy*, and Mullach's *Fragmenta Philosophorum Græcorum*.

Zeno, Emperor of the East 474-491, was a native of Isauria. He was compelled to leave Constantinople in 475 in consequence of a revolt in favour of his brother Basiliscus, but returned the following year. His whole reign was disturbed by revolts and foreign wars, and in 487, when the Gothic king took up arms and threatened Constantinople. Z., to save himself and his capital, gave him permission to invade Italy and expel

the usurper Odoacer. Z. published the *Henoticon* (ένοτικόν), or instrument of union, which was signed by all the bishops of the East under his reign, and that of Anastasius.

Zeno, Apostolo (1668-1750), an Italian dramatist and literary historian, born at Venice. He was one of the founders of the critical periodical *Giornale de' Letterati d'Italia*, and made his reputation in Italian literature by libretti for the musical drama: indeed he has been called the father of Italian opera. For many years he was the chief dramatic poet of Italy, and acted as court poet and historiographer to the emperor Charles V. He wrote *Observations on the Italian Historians* (2 vols.); and his dramatic works were printed in 1744 in eleven volumes.

Zeno, Niccolo (1340-91), a Venetian explorer; with his brother, Antonio, made various voyages of discovery; indeed, the discovery of America, prior to the voyage of Columbus, has been attributed to them. See Major, *The Voyages of Niccolo and Antonio Zeno* (Hakluyt Society, 1873), and Fiske, *The Discovery of America* (vol. i.) 1892.

Zenobia, Queen of Palmyra (Tadmor in the wilderness). After the death of her husband, Odenathus (266 A.D.), she assumed the imperial diadem, as regent for her sons. She sought to include all Syria, Asia, and Egypt within the limits of her sway, and to make good the title which she claimed of Queen of the East. She was defeated by Aurelian, taken prisoner on the capture of Palmyra (273), and carried to Rome. Her life was spared by Aurelian, and she passed the remainder of her years with her sons in the vicinity of Tibur (Tivoli). Longinus lived at her court, and was put to death on the capture of Palmyra.

Zenodotus (Ζηνοδοτος) (fl. c. 208 B.C.), a Greek grammarian, was a native of Ephesus. He was the first Reviser (Διορθητής) of Homer, and the first superintendent of the great library at Alexandria.

Zenta, a tn. of Bacs-Bodrog co., Hungary, on the Theiss, 33 m. S. of Szegedin. Agriculture, fishing, and cattle-rearing are the chief industries. Prince Eugene defeated the Turks here (1697). Pop. about 28,590.

Zeolites, a family of minerals consisting mainly of hydrous silicates of lime, soda, and alumina, which have resulted from the alteration of felspars and felspathoids. Being chiefly secondary products, they occur in cavities and veins, and are common in amygdaloidal basalts, where they present a finely fibrous structure. Among the more common zeolites are

analeite, natrolite, stilbite, prehnite, and laumontite. They have a specific gravity of about 2-3, and a hardness of from 3-5-5.

Zephaniah, the ninth of the minor prophets, has left a short but most valuable prophecy. He prophesied in the reign of Josiah, king of Judah (639-608 B.C.), almost certainly before the discovery of the Book of the Law. His book has two main divisions (1) Chapters i. 2 to iii. 8, containing a warning of judgment; (2) iii. 9-20, giving a promise of salvation.

Zephyrus (Ζέφυρος), the personification of the West wind, was the son of Astræus and Eos. He was the father of the horses Xanthus and Balius by the Harpy Podarge, and the husband of Chloris, by whom he begot Carpus.

Zeppelin, Ferdinand, Count von, a German army officer and aeronaut, born at Constance in 1838. He studied at the Polytechnik, Stuttgart, and at the Kriegsschule, Ludwigsburg, afterwards proceeding to Tübingen University. He took part in the American War of Secession, and also served in the Franco-German War (1870), but from 1897-1900 was occupied in the construction of his first airship or rigid type, making

in 1900. Several of its improved successors came to grief, but on the whole the rigid dirigible has made the most important progress and that chiefly owing to Z. The last Zeppelin, built in 1913, and acquired by the German navy, had a length of 525 ft. and a volume of 776,000 cu ft., and was capable of a speed of 52 m. an hour. The latest military Zeppelin also carries a machine gun. Z. started a passenger air service in 1910.

Zerashan, a river of Russian Central Asia, which rises in E. Samar-kand at the foot of a glacier of the Alai Mts. Passing through Lake Iskander, it enters Bokhara and loses itself in the sandy basin of the Amu-Daryn. Length about 450 m.

Zerbst, a tn., Anhalt, Germany, on the Nuthe, 22 m. S.E. of Magdoburg; has manufs. of gold and silver goods, silk, cloth, leather, soap, and chemicals. Parts of the ancient walls remain. Pop. 19,209.

Zermatt, a vil., Valais canton, Switzerland, at the head of the Visp Valley (5315 ft.), and at the foot of the Matterhorn, 22 m. by rail, from Visp in the Rhone Valley; is a favourite tourist resort. Pop. 800.

Zero (Arabic *ṣafra*, to be empty), a term applied in mathematics to 0, or to quantity so small, as to be negligible, and in physics to a point which serves as the base of measurements.

Zeuglodon, a genus of extinct

whales, found in the Eocene and Miocene strata of N. America, Europe, and Egypt. They were upwards of 50 ft. long, and the skull, which had powerful toothed jaws, was long and narrow. The brain cavity was smaller than that of existing whales. The fact that the teeth were implanted in sockets enabled Professor Owen to prove that the first discovered remains were not those of an enormous reptile, as was supposed. See *Catalogue of the Tertiary Vertebrata of the Fayûm, Egypt* (Brit. Mus. Nat. Hist.)

Zeugma (Gk. Ζεύγμα, a yoking), a figure of speech in which a verb or adjective is used with two nouns, though strictly referring only to one.

Zeulenroden, a tn., in the principality of Reuss-the-Elder, Germany, 35 m. N. of Hof, manufs. of hosiery, textiles, and machinery. Pop. 10,365.

Zeus, see JUPITER.

Zeuss, Johann Kaspar (1806-56), a German philologist, born at Vogtendorf (Bavaria). Studied at Bamberg and Munich. Took up the study of comparative philology. Wrote (1837) *The Germans and the Neighbouring Races* and other works. His great

work is his *Celtic Grammar*, a work of vast and painful labour.

Zeuxippus, a Greek philosopher. He was one of the leaders of the New Academy, which sought after the death of Pyrrho to carry on the teachings of the Pyrrhonist scepticism.

Zeuxis (fl. 425-400 B.C.), a celebrated Greek painter, born at Hieraclea. He belonged to the Ionic school of art and apparently drew his inspiration from Apollodorus. Pliny, Lucian, and Cicero tell many curious anecdotes concerning him. The chief works ascribed to Z. were an 'Eros at Athens,' an 'Infant Hercules,' and 'Jupiter enthroned.'

Zoyla, or Zalla, a tn. in Somaliland, E. Africa, on the Gulf of Aden; occupied by the British since 1881. It exports mother-of-pearl, coffee, and hides, but has lost its former commercial prosperity. Pop. about 5000.

Zeist, or Zeyst, a vil. in the prov. of Utrecht Netherlands, with manufs. of porcelain-stoves, candles, soap, etc. Pop. 12,806.

Zgierz, or Zgerz, a tn. of Prussian Poland, in the gov. of Piotrkow, 6 m. N.W. of Lodz. Pop. 19,000.

Zheleznovodsk, a tn. in the prov. of Terek, N. Caucasus, Russia, visited as a health resort on account of its iron springs.

Zhitomir (Russia), see JITOIR.

Zhob, a river of N.E. Baluchistan. Rises in the Khand and runs E. to Gonal, where it turns N.N.E.

and joins the Goumal. It was explored in 1864 by Lientenant Wahab, who describes the valley as an alluvial plain of fair fertility. It is of strategical importance.

Ziani, a noted Venetian family, of which the chief members were: *Sebastiano* (d. 1179), doge of Venice from 1172, who founded the ceremony of casting a ring into the Adriatic as a symbol of the marriage of Venice with the sea; and *Pietro* (d. 1229), doge from 1205, who conquered the Greeks.

Zibet, see *Civet*.

Zichy, Eugen, Count (b. 1837). a Hungarian traveller and collector, born at Zichy-falva. He explored the Caucasus and Central Asia, and subsequently published *Voyages au Caucase* (1897).

Ziegenbalg, Bartholomew (1683-1719), a German missionary to India, born at Pulsnitz in Lusatia, and died at Tranquebar, S. India. He translated the Bible into Tamil, and wrote a *Grammatica Damulica*. See *Halle Reports*, edited by G. A. Francke.

Ziegenhals, a tn. in Silesia, Prussia, 31 m. S.W. of Oppeln, with manufs. of paper and gloves. Pop. 978.

Zielenzig, a fort. tn. in the prov. of Brandenburg, Prussia, 26 m. E.N.E. of Frankfort-on-Oder. Pop. 5704.

Zierikzee, a seaport in the prov. of Zealand, Netherlands, the chief town of Schouwen Is., with shipbuilding yards and good fisheries. It played an important part in the Hanseatic League. Pop. 6808.

Zieten, Hans Joachim von (1699-1786), a Prussian general, born at Wustrau. He joined a cavalry regiment, and served in the Silesian wars and in the Seven Years' War with great distinction. See *Life* by Winter (1885).

Zilah, or Zillenmarkt, a tn. of Transylvania, in the co. of Szilagy, Hungary. Pop. 7600.

Zilleh, or Zila, a vilayet of Sivas in Asia Minor. It was from here that Cæsar conquered the Pharnaces after having made his famous boast, *Veni, vidi, vici* (47 B.C.). Pop. 20,000.

Zillerthal, a beautiful Alpine valley of the Tyrol, 25 m. E. of Innsbruck. It is watered by the Ziller, a trib. of the Inn. A number of the inhabitants fled from religious persecution to Prussia in 1837.

Zimbabwe, the site of some ruins in S. Rhodesia, S. Africa, 120 m. E. of Sofala. Discovered by Renders, 1868; described by Mauch, 1871. They present the general appearance of a fortress, and were probably erected either by Arabs or by one of the Bantu races.

Zimmermann, Albert (1808-88), a German painter, born at Zittau. He

excelled in painting pictures of scenery and of classical mythology.

Zimmermann, Johann Georg, Baron von (1728-95), a philosophical writer and physician, born at Brugg. He acquired considerable fame by his book, *On Solitude*, which was full of a sort of sentimental charm that was more appreciated in his day than in ours. His reputation as physician and philosopher gained him the friendship of Frederick the Great, whom he attended in his last illness, and by George III., who made him his private physician at Hanover.

Zimmermann, Reinhard Sebastian (1815-93), a Swiss genre painter, born at Hagenau, Switzerland. He studied at Munich and afterwards in Paris, ultimately settling in the former town, where he exhibited 'The Three Magi' in 1850. Other pictures by him are: 'An Interrupted Game of Cards' and 'Scene in a Village Inn.' He was also the author of *Erinnerungen eines alten Malers*, 1884.

Zinc (Zn, 65.4), a metallic element stated to be found in the uncombined condition, but generally met with in combination as the carbonate (calamine), $ZnCO_3$, and the sulphide (zinc blende), ZnS . It also occurs as silicate (hemimorphite), $ZnSiO_3 + H_2O$, and as red zinc ore, ZnO . The extraction of the metal from its ores is carried out in two stages, the oxide being first formed and in the second stage this is reduced by carbon. Blende is the ore generally employed, and this is converted to oxide by roasting in air. The crude oxide is mixed with coal or coke and strongly heated by gas-fired furnaces, in clay retorts or muffles, and the zinc vapour condensed in an iron box (Silesian process). In the Belgian process the mixture is heated in a horizontal fire-clay tube connected by a conical clay tube to a sheet iron condenser. The crude zinc is melted in a reverberatory furnace and further purified by distillation. Zinc is a bluish-white brittle metal (sp. gr. 7, melting-point 430° , boiling-point 930°) which is malleable between 100° and 150° C. At 300° C. it can be powdered in a mortar. It is permanent in air at ordinary temperature, and is used for galvanising iron for roofing purposes, etc. A number of alloys are formed by zinc with other metals, e.g., brass (copper and zinc), bronze (copper, tin, and zinc), etc. Zinc burns in air, forming the oxide, ZnO (zinc white). The oxide is white at ordinary temperature, but becomes yellow on heating. It is a basic oxide, and the salts of the metal can be prepared by its solution in acids. Zinc sulphate is obtained by solution of the metal or oxide in sulphuric acid, or is made

on the large scale by roasting zinc blende in air. The sulphate crystallises from water, forming colourless rhombic prisms of the formula $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ isomorphous with magnesium sulphate (Epsom salts). It has a metallic, astringent taste. It is poisonous, and is used as an emetic. Zinc chloride is formed by dissolving the metal or oxide in hydrochloric acid, and boiling the solution down until it solidifies on cooling. It is a white deliquescent substance, and made into a paste with zinc oxide rapidly sets to a hard mass. This mixture is used in dentistry as a filling. A solution of the chloride is used as a flux in soldering.

Zincke, Christian Frederic (1684-1767), a German miniature painter. Coming to England in 1706, he soon won great fame; found a keen patron in George II., and received many commissions from members of the English nobility. Among his miniatures is one of Prince Charles Edward Stuart, now in the possession of the Earl of Wharfedale, while the National Portrait Gallery also has one of Z.'s works.

Zinography, see PROCESS WORK.

Zinder, or Sinder, a walled tn. of French Sudan (Upper Senegal and Niger Colony), W. Africa, 350 m. from Timbuktu, cap. of Damerghu dist. There is trade in salt, spices, silks, ostrich feathers, etc., and telegraph communication with Kayes and Niamey. It is a centre for trade across the Sahara to Tripoli. Pop. about 18,000. See Foureau in *La Géographie* (Dec. 1900); Jenn, *Les Touareg du Sud-Est* (1909).

Zingerle, Ignaz Vincenz (1825-81), a German scholar and Benedictine monk, born at Meran. He possessed a wide knowledge of German folklore and ancient mythology.

Zinzendorf and Pottendorf, Nikolaus Ludwig, Count von (1700-60), a German theologian, born at Dresden. He founded the colony for Moravian Brethren. as a result was banished.

(1736-48). He travelled in Europe and America, reviving and organising the Moravian Church, and wrote many hymns and an autobiography. See Lives by Boret (1865) and Spangenberg (1772-75).

Zion City, see DOWIE, JOHN ALEXANDER.

Zipaquira, a tn. in the dept. Cundinamarca, Colombia, 30 m. N.E. of Bogotá, with coal mines. Pop. 12,000.

Zircon, a mineral of the composition silicate of zirconium, which is found in Norway, Ceylon, and the Urals. It forms tetragonal crystals, colourless to yellow, which are very

hard (hardness 7.5, sp. gr. 4.7). The yellow Zs. of Ceylon are termed 'jargons,' and the red-brown varieties are called 'hyacinths.'

Zirconium (Zr, 90.6), a metallic element which occurs in nature as the silicate (zircon). It has been obtained in two forms, crystalline and amorphous, the former variety requiring a high temperature for its combustion, while the latter burns when gently heated in air. The metal is obtained by heating the fluoropotassium compound with aluminium or sodium. The normal salts are prepared from the feebly basic tetravalent hydroxide $\text{Zr}(\text{OH})_4$.

Zirknitz, Lake of (ancient *Lacus Lugens*), a lake in Carniola, Austria-Hungary, 20 m. S.W. of Laibach. Its depth varies from 5 to 18 ft., and its area from 16 to 20 sq. m., according to the rainfall.

Ziska, or Zizka von Trocnow, Johann (1360-1424), one of the most celebrated leaders of the Hussites of Bohemia, born near his father's castle of Trocnow. In his youth he was gloomy and fond of solitude, and soon left the court, where he had been a page in the retinue of Wenceslaus of Bohemia. He served for a while in the English army, and later fought in Poland and Hungary. In the uprisings that followed the death of Huss he was commander-in-chief of the Hussite army, which position he filled with great success. He was buried at Czeslau.

Zither, a stringed musical instrument plucked with a plectrum, which dates from the earliest times. It consists of a flat box which lies on the table, strung with five metal strings passing over frets, and from twenty-seven to forty strings of various kinds played as open strings, plucked with the fingers, to form the accompaniment to the melody which is played with the plectrum on the strings nearest the performer. It is the

instrument of Bavaria, and Tyrol, for it is played by *as* and no *inn* without one.

Zittau, a tn., Saxony, Germany, on the Maudau, 48 m. E.S.E. of Dresden; manufs. linen, damask, woollens, and pottery. Lignite is mined. Pop. 37,084.

Zittel, Karl Alfred von (1839-1904), a German geologist and palaeontologist, born at Bahlingen in Baden. His chief work was *Handbuch der Palaeontologie*, which was completed in 5 vols. in 1893, but he also published *Aus der Urzeit*, 1873; *Die Sahara*, 1883; *Über den geologischen Bau der Libyischen Küste*, 1880, an account of the Rohlfs's expedition to the Libyan desert; and *Geschichte der Geologie und Palaeontologie bis Ende des 19. Jahrh.*

hundreds (1899). a monnmental his-
tory of the progress of geological
science. He was professor of palæo-
logy in the University of Munich in
1866, to which was added the chair of
geology in 1880. He was also ap-
pointed director of the natural his-
tory musenm there, and from 1899
was president of the Royal Bavarian
Academy of Sciences. Z. was re-
garded as a distinguished authority
both on geology and palæontology,
and from 1869 till his death was the
chief editor of the *Palæontographica*.

representative is called the gopher.

Zlatoust, a tn. in the gov. of Ufa, in E. Russia, 147 m. N.E. of Ufa, with iron foundries and machinery works. Pop. 22,000.

Zloczow, a tn., Galicia, Austria, 45 m. E. of Lemberg, has a mediæval castle and manufactures linen. Pop. 13,212.

Zmeinogorsk, a tn. in the gov. of Tomsk, Siberia. Some lead and silver are found. Pop. about 7000.

Znaim, a tn. in the prov. of Moravia, Austria-Hungary, on the Thaja, 47 m. N.N.W. of Vienna. It has the ruins of an old castle and a rathaus. Earthenware is manufactured. The armistice of Z. was concluded here after the battle of Wagram between the French and Austrians, 1809. Pop. 18,828.

Zoan, see TANIS.

Zeor: 1. A vil. in Tuscarawas co., Ohio, U.S.A., on the Tuscarawas R., 14 m. S. of Massillon. A German socialist society was established here during 1853-98. Pop. (1910) 182. 2. (called Bela, 'devoured') in Genesis xiv. and xix.) was situated to the N.E. of the Dead Sea, Palestine, and was one of the 'five cities of the plain' spared as a refuge for Lot.

Zodiac, a belt of the celestial sphere 16° wide, extending for 8° on each side of the ecliptic. Its antiquity is very great, and the region was noted by different peoples independently, a fact explained by its containing all the known heavenly bodies with proper motions, the sun, moon, and planets. The division into twelve signs, each extending over 30°, served to mark divisions of the year, each being marked by the entry of the sun, in his westward course, into a group of stars. The names have a seasonal significance interpreted with myth, and differ with the nations. Hindus, Chaldeans, Egyptians, Greeks, and Aztecs. As the sun in spring passes the middle of his ascent he travels through Aries, ♈; Taurus, ♉; and Gemini, ♊ respectively; at the solstice he is in Cancer ♋, then com-

mences his descent through Leo ♌, and Virgo ♍, these three marking the summer; Libra ♎, Scorpio ♏, Sagittarius ♐, are then passed through in autumn; Capricornus ♑, is occupied at the beginning of winter, Aquarius ♒, and Pisces ♓, being traversed in the first part of the ascent. The 'ascending' signs are thus those of winter and spring, the 'descending' those of summer and autumn. The tropics of Cancer and Capricorn are circles of latitude vertically under the sun at the solstices, and he is in those signs. The

... he is in those signs. The
... not now agree with the con
... bearing their names owing
to precession (*q.v.*). Aries is in Pisces,
and so on, the signs 'backing' into
constellations to the W.

Zodiacal Light, a faint haze of light extending from the sun along the ecliptic, visible just after sunset or before sunrise as a cone extending above the sun's place into the sky. It is best seen in the evening about the vernal equinox, when the eastern portion of the ecliptic is most nearly perpendicular to the horizon: in the morning at the autumnal equinox, the western portion being then most so inclined. It is for these reasons best seen within the tropics, when it can be observed under favourable conditions right across the sky. Here the counter-glow or *gegenschein*, a bright patch of a few degrees in diameter, is seen exactly opposite the sun. The brightness of the Z. L. is sometimes quite conspicuous, though less so than the Milky Way. The spectrum is continuous, without bright lines, but too faint to show dark lines if they should be present. At the horizon it is 20° to 30° broad, and it extends to within about 10° of the zenith. It is most generally supposed to be due to sunlight reflected from clouds of meteoric bodies extending in a flat disc round the sun to the plane of the solar equator, and beyond the earth's orbit. It has been photographed by Dr. Wolff and Mr. A. E. Douglass. Another theory considers it as an extension of the corona and of an electrical nature. Dr. Abbott likens it to the nebulosity visible in the Pleiades, and Seiliger considers it possible that Leverrier's observed perturbation of M^{er}curey may be due to the portion within that planet's orbit.

Zoe (c. 975-1050), a Byzantine empress of the East, daughter of Constantine IX. She married Romanus Argyrus in 1028, but murdered him in 1034, and subsequently by marriage raised to the throne Michael IV. (1034) and Constantine IX. (1042).

Zoëga, Johann Georg (1755-1809), a Danish archaeologist, born in

Schackenburg, Jutland, of Italian origin. He finally settled at Rome (1782), where he published his works on numismatics, the chief being *Numi Egyptii Imperatorii* (1787). He also made a catalogue of Coptic MSS. See *Life* by Welcker (1819).

Zoepffel (or Zopffel), Richard Otto (1843-91), a German theologian, born at Arensburg in Livonia. He lectured on theology at Göttingen and Strassburg, and wrote *Die Papstkrähen* (1871) and *Johannes Sturm* (1887).

Zoffany (or Zoffani), Johann (1735-1810), a German artist, a friend of Sir Joshua Reynolds, born at Ratisbon. He settled in England (1758), and became an R.A. (1768). His works include portraits of Garrick and other famous contemporaries, and 'Embassy of Hyder Ali to Calcutta.' etc.

Zohar, or Sohar, see CABBALA.

Zoilus, a grammarian, was a native of Amphipolis, and flourished in the time of Philip of Macedon. He was celebrated for the asperity with which he assailed Homer, and his name became proverbial for a captious and malignant critic.

Zola, Emile Edouard Charles Antoine (1840-1902), a celebrated novelist and journalist, born at Paris. His mother was a Frenchwoman, and his father, François Z., a soldier and civil engineer, was of mixed Italian and Greek descent. The death of his father left Z. and his mother in poor circumstances, and but for the help of relatives his educational facilities would have been much less than they were. He early showed his taste for literature by writing when at school a comedy entitled *Enfoncé le Pion* (Making a Fool of the Usher). On leaving school he worked as a clerk at Villette, and later in the publishing house of Hachette. He was then writing articles for *Le Petit Journal*, stories for *La Vie Parisienne*, and also a series of critical papers for *Le Salut Public* of Lyons, which were subsequently published in book form as *Le roman expérimental*.

Zola's first book, *Le roman expérimental*, was published by Hachette's and art criticisms for the *Événement*; but though he was a first-rate journalist of the trenchant and slashing style, he does not seem to have met with any great success in that direction. He therefore turned his attention to novel writing. His novels fall into two well marked classes: first, the frankly sensational and novels of the Rougon-Macquart series, in which, as an exponent of realism, Z. proved himself the master of his age. Perhaps nothing quite so cruelly poignant has ever been written as *L'Assommoir*, in which he graphically describes, without the slightest regard for conven-

tion or other people's feelings, the fearful results of drink upon the fortunes of an artisan family. The second class of his works subordinate characterisation, and indeed, the story, to the inculcation of Socialist philosophy. *The Four Gospels* and *Épouvante* and *Travail* and *Vérité* exemplify this aspect of his work. The Rougon-Macquart series include, among others, *La Fortune des Rougons*, *Le Ventre de Paris*, *La Conquête de Plassans*, *L'Abbé Mouroir*, *L'Assommoir* (which perhaps is better known to English people in the anglicised dramatic version of *Drink*, in which Charles Warner took the leading rôle), *Nana* (the narrative of an attractive *fille de joie*), *Pot-Bouille*, *La Joie de l'irre*, *Germinol*, etc., etc. Perhaps his best known work is *La Débâcle*, a story of the bitter humiliation of France in the war of 1870. He earned the undying gratitude of all continental opponents of anti-Semitism and the warm encomiums of the press of the whole civilised world by his challenge to the

... five Dreyfus a ... which appeared

... of the celebrated manifesto *J'accuse*. He died under strange circumstances in his home, where he was found asphyxiated by the fumes of a charcoal stove.

Zola, or Tola, a tn. on the Upper Benue, Nigeria. See TOLA.

Zolkiew, a tn. in Galicia, Austria-Hungary, with a ruined castle in which John Sobieski of Poland once lived. Pop. 9163.

Zolliker, Georg Joachim (1730-88), a Swiss preacher, born at St. Gall, in Switzerland. Having studied at Bremen and Utrecht, he ultimately became pastor at Leipzig, where he distinguished himself by great purity of character, eloquence, and general abilities. His *Devotional Exercises* and *Sermons* have been translated into English.

Zöllner, Johann Karl Friedrich (1834-82), born in Berlin, and became professor of astronomy at Leipzig in 1866. He invented the astrophotometer for determining the brightness of a star by comparison with an 'artificial one' from an oil lamp. His chief work was in photometry and spectrum analysis. His writings include: *Photometrische Untersuchungen*, 1865; *Grundzüge der Himmelskunde*, 1871; and numerous contributions to *Pogg. Annalen*, and *Gesellschaft der Wissenschaften*.

Zollverein, the Prussian or German custom union, founded through the efforts of ... 1834, ... establishment of a uniform rate of

customs duties throughout the various states joining the union. The Z. was the decisive event in German commercial policy, and led directly to German national unity. By it protection was limited to 10 per cent. on manufactures and a uniform duty of 1s. 6d. per cwt. was imposed on all goods. The Anglo-French treaty of 1860, however, resulted in a reversion towards free trade and a treaty with England, as a consequence of which the import duty of 1s. 6d. was abolished together with certain corn and other duties. The word is also now used in a general sense to denote any customs union. See **TARIFF**.

Zom, Anders (b. 1860), a Swedish artist, and a native of Stockholm, he has lived also in France, England, and America, and has done much remarkable sculpture and painting. But he is mainly known by his etchings, one of which enjoys particular fame being a portrait of Ernest Renan.

Zomba, a tn., the government headquarters, in the Nyasaland Protectorate (formerly British Central Africa), between Biantyre and Lake Nyassa, on Mt. Zomba at an altitude of 3000 ft. Pop. about 80 Europeans.

Zombor, a royal free city of S. Hungary, cap. of Bacs co. It is connected by the Franz-Joseph Canal with the Rs. Danube and Theiss, and is an important market. Pop. 30,000.

Zonares, Joannes, a Byzantine historian and theologian of the 12th century, who wrote a *Chronicon*, or history of the creation down to the year 1118. (See edition by Du Cange, 1686). Originally the private secretary and commander of the imperial guard of Alexius Comnenus, he became a monk and died in seclusion at Mt. Athos.

Zone, geometrically, the portion of the surface of a sphere intercepted between two parallel planes. The earth's climatic Zs. are determined by planes at the Arctic and Antarctic circles, and the tropics of Cancer and Capricorn. The resulting Zs. are known as the frigid, consisting of the polar caps; the torrid, between the tropics; the temperate, between the frigid and the torrid. They merely mark out the incidence of the sun's radiation, and are only useful as determining that factor, rather than as giving any clue to actual climate. Actual thermometric observations have led to the establishment of *thermal zones* between certain isotherms. The equatorial or tropical regions are marked by climate and vegetation arranged in *vertical zones* between different heights above sea-level. In astronomy, star-catalogues are based on Zs.; Bessel's, of 64,000

from decl. -15° to +45°; Argelander's, of 40,000, from -31° to +80°; Gould's, of 73,160, from -23° to -80°. The *Internal Astro. Cal.* and the *Cape Photograph. Durchmusterung* are arranged in Zs. of 1°.

Zone System, a method, largely in vogue on the Continent, of arranging railways in zones from a central point, for the purpose of simplifying railway fares, and for encouraging tourist travel. Thus the fare for any distance up to 10 m. is uniform; from 10 m. to 20 m. an addition is made, and so on; so that a person travelling 20 m. pays the same fare as one travelling only 11 m., and thus travels at his expense. The fares are, however, usually low.

Zoo-Geography, see **GEOGRAPHICAL DISTRIBUTION**.

Zoological Society, a society for the promotion of the study of animal life. At its Zoological Gardens (the Zoo),

as a magnificent

animals admirably housed, and cared for with the utmost skill. Recent improvements (1913) include the Mappin terraces, occupying a quadrant-shaped area, in which the animals are seen in successive tiers of enclosures, and an additional insect house. The Society meets frequently to discuss zoological topics, and publishes quarterly *Proceedings*. See Scherren, *The Zoological Society of London*.

Zoology (from *zōon*, an animal, and *lógos*, a discourse) literally means a discourse concerning animals, and is the science which teaches the nature, properties, and classification of the subjects of the animal kingdom.

Zoospore, see **SPORE**.

Zor, a mutessarifiat or prov. of Turkey in Asia, lying on both sides of the middle Euphrates. Area 30,110 sq. m. Pop. about 100,000.

Zorndorf, a vil. of Prussia in the prov. of Brandenburg, famous as the scene of the defeat of the Russians by Frederick the Great in 1758. Pop. about 2300.

Zoroastrianism, the religion of the Persians, introduced by Zoroaster or Zarathushtra, who probably lived about 800 B.C. He was either a Mede or a Bactrian, and was evidently a man of extraordinary personality. Tradition that has gathered around his life, speaks of miraculous signs at his birth, his great wisdom even as a child, whereby he was able to confound the Magi, and of his being borne up to the highest heaven and given the sacred word of life from the Deity. He commenced teaching at the age of thirty, after many years spent in contemplation, and died at the age of seventy-seven. The re-

ligion he founded was the national religion of the Persians from about 550 B.C. to the middle of the 7th century A.D. At this time Persia was invaded by the Mohammedans, and the faithful followers of Zoroaster fled to India, and are now represented by the Parsees (q.v.). Z. is based on a dual conception of a good principle *Ahura Mazda*, and an evil one *Angra Mainyu*, who are in conflict, and must be until the end of the period ordained by *Ahura Mazda* for the duration of the world. Z. was a practical, ethical doctrine inculcating active charity, kindness to animals, and moral featur fire worshi v.). togeth of preventing defilement. Each man, according to Z., has a free will, conscience, and a soul, and a guardian spirit or prototype of himself who dwelt above, and was called a *fravashi*—being really his own character put into a spiritual body. Having the choice of good and evil, man naturally has to suffer the punishment of sin. After death for three days the soul hovers about its earthly abode. During this time funeral rites are performed. Then on the fourth day *Sraosha* carries the soul aloft, demons endeavouring to gain his burden. The fires lit by the friends of the deceased are supposed to keep these evil spirits in check. Arriving at the bridge between earth and heaven, *Mithra* and *Rashnu* cast up the soul's good and bad deeds. Then, having done penance for the bad ones, the soul crosses. If fit for heaven the bridge is broad and easy to cross, but, if not, then the bridge seems but a hair's breadth, and he falls into the gulf beneath. Those who cross pass into everlasting light. Zoroaster tells of a 'far-off divine event' which will be heralded by signs and wonders. For 3000 years beforehand periods of peace and overpowering evil will alternate, and at last the great dragon will be loosed, and a fearful time ensues until Mazda sends a man who will slay it. The savi will be born of a vi: will wicked destroyed by a flood metal which will leave the harmed. Mazda and Saosha will then overcome Ahriman and the dragon, and everlasting growth and life will take the place of age, decay, and death. See Dr. Moulton, *Early Zoroastrianism*.

Zorrilla y Moral, José (1817-93), a Spanish poet and dramatist. Born at Valladolid; studied for the law at Toledo and Madrid, but soon devoted

himself to literature. He visited Mexico during 1855-66. His works include an elegy on the death of Larra, 1837; *Juan Dándolo*, a play in collaboration with García Gutiérrez, 1839; *Cantos del Torador*, 1841; *Granada*, an incomplete epic, 1852; *El Zapalero y el Rey*, a comedy, 1840; and *Leyenda del Cid*, 1852.

Zosimus (c. 408-450), a Greek historian, a native of Constantinople. His chief work is *Historia Nova*, a continuation in six books of the history of Dexippus, extending up to the year 410. It forms a valuable authority for the 5th century, and is clear and concise. The author is a strong opponent of Christianity. See editions by Meuselsohn (1887).

Zouaves, a body of troops in the French army, so called from the Kabyle (Algeria) tribe of Zwawa, from whom General Clausel formed a regiment in 1830. These native troops were at first officered by Frenchmen, and a certain number of Frenchmen were included in the ranks, but this proved unsatisfactory, and the native element gradually died out. The Moorish dress is still maintained, and there are now four Zouavo regiments, formed from picked veterans from infantry regiments.

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R. Lämpö, and the source of many of the tributaries of that river. The range is a continuation of the Drakensberg, and the height ranges from 3000 ft. to 4500 ft. In the district are some important goldfields. The chief towns are Leydsdorp and Pietersburg, round which are some rich coal and copper mines.

Zrinyi, Niklas, Count von (1508-66), a Hungarian general. He served with distinction at the siege of Vienna (1529) and in the campaigns against John Zápolya and Sultan Solymán. In 1542 he became Ban (governor) of Croatia, and for twelve years defended it against the Turks. In 1563 he was made commandant of Sziget, and in 1566 was besieged, with only 3000 men, by 65,000 men under Solymán, being killed in the fighting on the fall of the city.

Johann Heinrich Daniel, German writer, born at Magdeburg; ran away from school to become a strolling playwright, and later studied and lectured at Frankfurt. After travelling for some years, he opened a boarding-school at Reichenau, Switzerland; and in 1798 went to Aarau, where he filled several important positions. His works include: *Aballino* (1791, a novel, later dramatised); *Geschichte des Freistaats*

der drei Bünde in Rhätien, 1798; *Stunden der Andacht*, 1809-16, a rationalistic religious manual, translated into English (1843); *Des ...*, 1822; *... stschau*, ... 7), and works appeared in thirty-five volumes, 1851-54.

Zschoppau, a tn. of Saxony, on a stream of the same name, tributary to the Mulde, 15 m. S.E. of Chemnitz, with textile manufs. Pop. 6730.

Zuccarelli, Francesco (1702-88), an Anglo-Italian painter, born at Pitigliano in Tuscany. He settled as a young man in England, and soon won great fame by his landscapes, and as a scene-painter at the London Opera House; while he was among the original members of the Royal Academy, founded in 1768. The Glasgow Municipal Museum has a large array of his best works.

Zuccaro, Federigo (1543-1609), an Italian painter, born at Sant' Angelo; brother and pupil of Taddeo Z. He came to England in 1574 and found various patrons among the nobility, but in 1578 returned to Italy. A fine portrait of Queen Elizabeth, now at Hatfield House, is commonly ascribed to him; while the Glasgow Municipal Museum has a picture which is certainly his, and several others are in the National Gallery—for instance, one of the Earl of Leicester, and another of Sir Walter Raleigh. He completed Vasari's 'Last Judgment' in the dome of Florence Cathedral; carried out some of Michelangelo's designs for the Pauline Chapel; and decorated the Doge's Palace at Venice (1582) and the Escorial (1585-88). In 1895 he founded the academy of St. Luke at Rome.

Zuffenhausen, a tn. of Württemberg, Germany, 6 m. from Ludwigsberg. Pop. 12,752.

Zug: 1. A canton of Central Switzerland. Area 92 sq. m. S. and S.E. are mountainous, the highest peak being the Kaiserstock (8258 ft.). The rest is in the basin of the Reuss, and possessing suitable grazing and pasture, produces butter, cheese, etc. Pop. 28,013. 2. A tn., cap. of above, on Lake Zug. Pop. 8038.

Zuider, or Zuyder, Zee, an arm of the North Sea, penetrating into the N.W. Netherlands. Area 2027 sq. m. It consists of an oval inner part and a horn-shaped outer part, joined by a strait about 10 m. wide. A chain of islands—Texel, Vlieland, Terschelling, Ameland, and Schiermonnikoog—separate it from the North Sea, and are the remains of the original coastline. The Zuider Zee was formed in

the 13th century by the sea breaking through the sand dunes on the coast and flooding the lowlands between it and a small inland lake, with which the floods united. The Zuider Zee is very shallow, the depth never exceeding 40 ft. and being only 3 ft. over large areas. It contains several islands and receives the R. Yssel. A state drainage scheme for reclaiming the inner portion is in progress.

Zukertort, Johann Hermann (1842-88), a chess player, born in the prov. of Riga, of German ancestry, was educated for the medical profession at Breslau. After 1867 he devoted himself to chess. He edited a journal on the subject at Berlin in 1867-71, and in 1872 went to England, where he founded the *Chess Monthly*. He won numerous tournaments in London and Paris, but was defeated by Sreinitz in 1885.

Zula, a vil. of Eritrea, on Annesley Bay, also known as the Bay of Adulis or Zula. Near it are the ruins of the ancient Adulis.

Zulia, a state of Venezuela, area 26,000 sq. m. It is a fertile plain, with large forests, watered by the R. Zulia, and containing Lake Maracaibo. Cap. Maracaibo. Pop. 90,000.

Züllichau, a fortified tn. of Brandenburg, Prussia, 50 m. S.E. of Frankfurt-on-the-Oder. Pop. 8035.

Zulus (Amazulus), a S. African people belonging to the Bantu stock. Both physically and intellectually they are a fine race. They are advanced in domestic arts, and their main industries are pastoral, though iron work, pottery, copper, ivory, horn and wood ornaments, and baskets are made and hides are tanned. The men are of a warlike temperament and exhibit a notably 'sporting spirit.' The standard of morality is high in spite of the universal practice of polygamy. There is an extensive folklore and the unwritten code of laws is well observed. Government is by chiefs, through the heads of districts, and the constitution is thoroughly democratic. The importance of the nation dates from the beginning of the 19th century, when it was organised and led through a series of victorious campaigns by the chief Chaka, who practically became master of S. Africa from Cape Colony to the Zambesi. He was murdered in 1828 and was succeeded by his brother, Dingaan, who in 1838 brought about a war with the Boers, by whom he was defeated. The next rulers were Umhanda (d. 1873) and Cetewayo, during whose reign war broke out with Great Britain. The Z. gained a victory at Isandula (1879), but were defeated in the same year at Ulundi. Cetewayo's son, Dinizulu,

granted a strip of land to the Boers on which they established the 'New Republic,' while the remainder of Zululand was annexed to Great Britain in 1887. Dinizulu was exiled in 1888 as a result of a rebellion, and another rising under Bambaata, was suppressed in 1906. Dinizulu died in 1913. See T. B. Jenkinson's *Amazulu*, 1882; and Captain J. Stuart's *History of the Zulu Rebellion*, 1913.

Zululand, a dist. of S. Africa, since Dec. 30, 1897, a prov. of Natal. Area 10,461 sq. m. It includes Tongaland, and is bounded by Vryheid on the W., Swaziland and Portuguese E. Africa on the N., and the Indian Ocean on the E. and S.E. The surface is mainly mountainous. It is watered by the Tugela, Umbalusi, Umvoiosi, and Mkusi Rs. There are large forests, and the land is very fertile, corn, beans, sugar, cotton, and coffee being grown. Stock-raising is a growing industry. The mineral wealth is still unworked. The climate is healthy except on the coast, where fever is prevalent. Chief town, Ulundi. Pop. about 235,000 including 1700 Europeans. For history, see ZULUS.

Zumala-Carréguay, Tomas (1780-1835), a Spanish general, born in Guipuzcoa. He fought under Mina

der Quesada. In 1832 he army as a no leader of the Carlist forces in the Basque Provinces, gaining many victories over the Cristinos. He was mortally wounded at the siege of Bilbao.

Zumpt, August (1815-77), a German philologist, nephew of Karl Zumpt, born at Königsberg and educated at Berlin. He was a lecturer at various gymnasia in Berlin. His works, mainly dealing with Latin epigraphy, include *Studia Romana*; *Das Kriminabrecht der römischen Republik*, and *De*

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ob (1792-1849),
born at Berlin;
Heidelberg. In

1827 he was appointed extraordinary

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Curtius, Quintilian, and several works of Cicero, besides writing several valuable works on classical subjects.

Zungaria, or Dzungaria, a mountainous region of Sin-kiang, China, bordering on Russian Turkestan, and lying between the Tian-Shan on the S., the Greater Altai on the N., and the Mongolian Gobi on the E. The surface is mainly a desert and slightly hollowed plateau, but there are large tracts of forest, and the plains and valleys afford good pasturage, while

cereals are grown in parts. There are numerous mountain streams, but the only important rivers are the Black Irtysh and the Ili. The minerals include gold, copper, iron, and salt. The country was conquered by the Chinese emperor in the 18th century. The inhabitants include the Kalmauck Dzungars and Turgots, and also Khalkas and Dzungans, Chinese and Kirghiz.

Zungeru, the political cap. of N. Nigeria, W. Africa, in Zaria prov., on Kaduna R. in lat. 9° 49' N., long. 6° 9' E. It was made the administrative headquarters in place of Lokoja, still the commercial capital, in 1902. It is connected by railway with Baro, a port on the Lower Niger, open all the year, and with the Lagos railway by the line to Jebba.

Zunz, Leopold (1794-1886), a Jewish scholar, born at Detmold, Germany; studied at Göttingen and Berlin. He held several educational posts in Berlin. His works include: *Ethica über die rabbinische Literatur*, 1818; *Die gottesdienstlichen Vorträge der Juden*, 1832; and *Die Namen der Juden*, 1836.

Zurbaran, Francisco (1598-1662), a Spanish painter, a native of Fuente de Cantos. His family were peasants, but growing interested in art he soon left

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king, Philip IV., and in consequence the rest of his life was spent chiefly at Madrid. Many of his pictures are still in that town, while others are in the Louvre, the Pinakothek, and the National Gallery of Scotland; and nearly all of them are marvels of technical accomplishment, yet do not proclaim the artist gifted with any great imaginative faculty.

Zürich: 1. A canton of N. Switzerland, bordering on Baden. Area 666 sq. m. Its northern part is open and undulating, while the central and southern portions are very mountainous, with summits rising to 4000 ft. It forms part of the basin of the Rhine and is also drained by the Töss, Glatt, Limmat, Thur, Sihl, and Reuss. The greater part of Lake Zürich lies within the canton. Agriculture is carried on in the N., and manufs. of various kinds are carried on. Pop. (German and Protestant) 500,679. 2. Cap. of above canton, situated at the exit of the Limmat from Lake Zürich, 60 m. N.E. of Bern. The old part is very picturesque, and the town has a fine cathedral and a famous university and polytechnic. It is an important manufacturing and commercial centre, and

Zymotic (*ζύμη*, ferment), a term applied to diseases caused by the vital activity of certain micro-organisms. It was originally intended by Dr. Farr, the inventor of the term, to designate diseases promoted by processes analogous to fermentation. It is now applied to the chief acute infectious diseases: typhoid, cholera, small-pox, measles, scarlet fever, erysipelas, etc.

ADDENDUM

Psychology may be broadly defined as the science of mind. The word is derived from the Greek, and means the science of the soul. But in the course of time the word soul has undergone so many changes in meaning, that it is now too vague and hypothetical a term to take a place in what professes to be a natural science. Mind, therefore, is used as meaning 'that unity which holds together and combines the several states which we call psychical phenomena'; it being necessary to note that the question as to what mind is, lies really in the province of philosophy, P. only being concerned with the phenomena of soul. Logic, however, may also be said to be a science of mind. Therefore the definition adopted by M'Dougall may be used, viz. 'that psychology is the positive science of the behaviour of living things.' However defined, though, it must be recognised that P. deals with the phenomena of mind, or with states of consciousness. It cannot be defined in simpler terms, for the effort to do so leads into one of the deepest phases of P., viz. whether mental phenomena are always states of consciousness or whether there are some which are unconscious and which do not enter into our experience. We can think that mind is immaterial and exists, not in space, but in time only; but we must remember that there is a strong connection between mind and matter. All mental processes are accompanied by nervous action, and while we must be careful to be clear enough in our thinking not to regard psychical and physical as synonymous, yet we must regard mind as being inexplicably related to the living being by means of the nervous system or its actions. So we arrive at a grave difficulty. *Physiological P.* has led able men into the peculiar position of *psycho-physical parallelism*. It is known that the nervous processes of the brain are similar to the reflex processes of the spinal cord, and that they consist in transmitting physical impulses from the sensory to the motor nerves. Therefore, it is well founded that all psychical process is accompanied by neural process. This law of psycho-neural parallelism has,

however, led some men to think that if we could describe completely the nervous system of a man, and know the chemical and physical laws governing it, then we would know and could account for the conduct of that man. Huxley is, of course, the great protagonist of this view, which means that consciousness is caused by nervous processes in the brain, and that these processes are not reacted on, nor modified by, consciousness. Two other views adopted by considerations of this type are: (1) that the psychical and physical processes form two parallel series which never interact, and (2) that the psychical and physical processes form two parallel series of appearances, for one series of real events, and that these two series are but two modes of the same thing. This is the hypothesis of *psycho-physical parallelism*, but *physiological P.*, properly studied, leads to the idea that psychical and physical processes react or interact on each other, i.e. the hypothesis of *psycho-physical interaction*. So it can be seen that from the naturalistic view, psychologists have gradually arrived at that point where it is recognised that the primary basis lies in *introspective P.*, and that any objective methods must presuppose, and be based upon, accurate subjective methods (see *STRUCT.*). P. forms the basis of a number of practical sciences, the chief of which is *education (q.r.)*, this dealing with

mind on all
g. feeling, and
s branches, P.
ing, forms the
hetoric(q.r.); as
dealing with feeling, aesthetics; and as
dealing with willing, ethics (q.r.) and
politics (q.r.). See Sully, *Handbook
of Psychology*; M'Dougall, *Physio-
logical Psychology*; Lloyd Morgan,
*Introduction to Comparative Psycho-
logy and Habit and Instinct*; W.
James, *Principles of Psychology*.
G. F. Stout, *Manual of Psychology*
and *Analytical Psychology*. W.
Wundt, *Physiological Psychology*.
Lotze, *System of Philosophy*; Th.
Ribot, *Psychology of Attention*. See
also EMOTIONS, FEELINGS, MEMORY,
STRUCT. and WILL.